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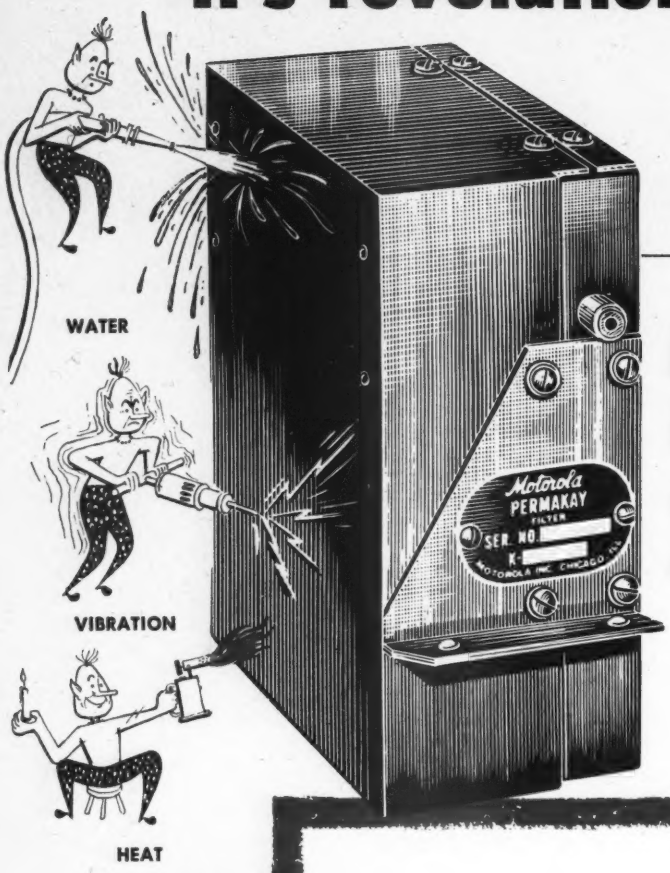

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SEPTEMBER, 1951

COVER: THE WESTERN HEMISPHERE with its prodigious development of radio-TV-electronic facilities, is presented as a major world market for U. S. engineers and manufacturers. With only 14% of the world's population, the Western Hemisphere today possesses 75% of the world's transmitter power, 75% of its tube sockets.

✲ *ELECTRONIC INDUSTRIES for DEFENSE . . . See articles marked with asterisks*

✲ **DEFENSE CONTRACTS—WHO GETS THE BUSINESS?** ..... *Stanley Gerstin* 28
Full impact of defense requirements may reach peak in 1952; may carry over for years, depending upon military situation

MEASURING TV TRANSMITTER AMPLITUDE CHARACTERISTICS. *John Ruston* 30
New unit, used in conjunction with general purpose oscillograph, provides a simple method for determining responses

✲ **GLIDE PATH CAVITY ANTENNA FOR JET FIGHTER AIRCRAFT.** *L. E. Raburn* 32
Horizontally-polarized, zero-drag, 329-335 MC unit fits into air intake; receives signals from any forward direction

SIMPLIFIED OPERATION KEYNOTED IN NEW TV EQUIPMENT *R. L. Garman and J. E. Cope* 34
Servo-controlled focus, extended remote control facilities including iris and lens change among features of TV chain

NEW UHF CONVERTER DESIGN FEATURES 37
More recent manufacturers' data provides additional details on the technical characteristics of television receiver tuners

NTSC COLOR-TV STANDARDS OUTLINED 39

✲ **HIGH-QUALITY DIRECT-COUPLED AUDIO AMPLIFIER** 40
Design features an overall 72 db gain with frequency response of 20-20,000 cps ± 0.5 db, harmonic distortion less than 2%

NEW MICROWAVE ATTENUATOR 43
Developed for coaxial transmission lines, this unit utilizes magnetic fields to obtain instantaneous attenuation changes

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Station and Studio Equipment Directory 83

TRANSMITTING EQUIPMENT
Broadcast
Remote Pickup
Aviation
Police, Industrial, Common Carrier
Tubes & Crystal Devices
Antennas & Ant. Accessories
Studio Transmitter Links
Point-to-point Microwave

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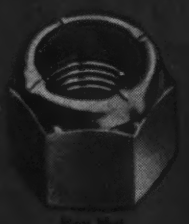

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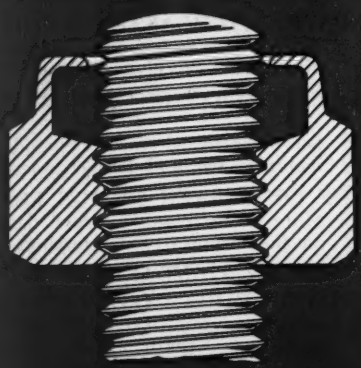

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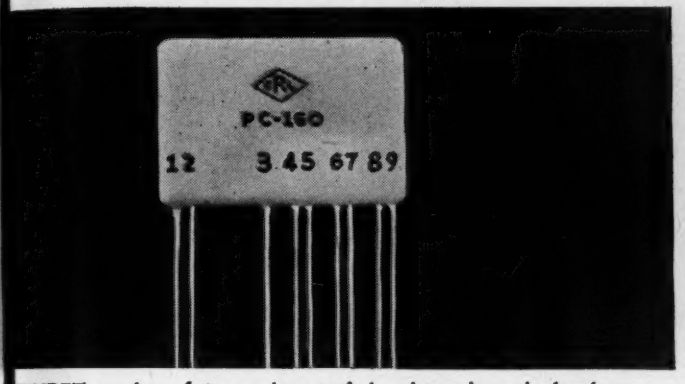
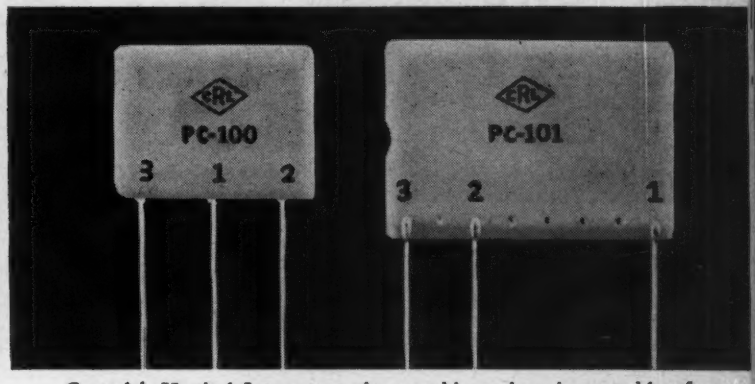


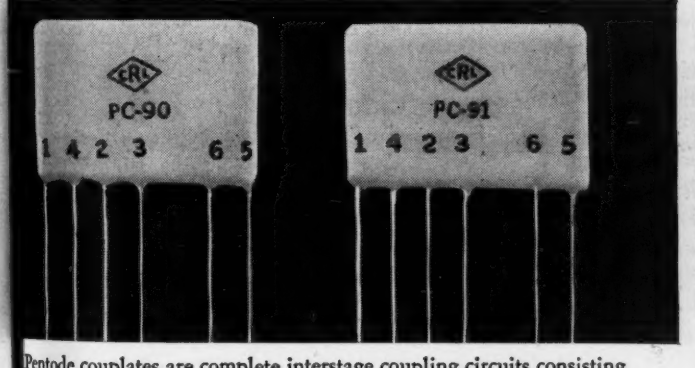
PENDET consists of 5 capacitors and 4 resistors in a single plate with only 9 leads. Similar to the popular AUDET, it is designed to couple the diodetriode and pentode tubes in the output stage of AC-DC sets. Check coupon for Technical Bulletin 42-149.

82% Less Soldered Connections With P.E.C. VERTICAL INTEGRATOR



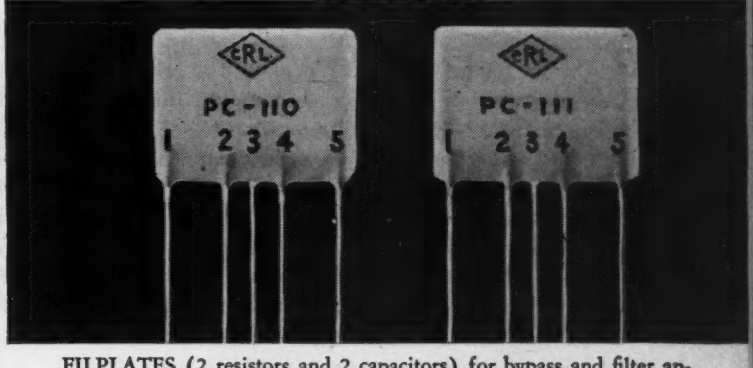
Centralab Vertical Integrators give you big savings in assembly of TV vertical integrator networks. One type consists of 4 resistors and 4 capacitors brought out to 3 leads . . . reduces former 16 soldered connections to 3! Check coupon for Technical Bulletin 42-126.

50% Less Soldered Connections With Centralab's PENTODE COUPLATE



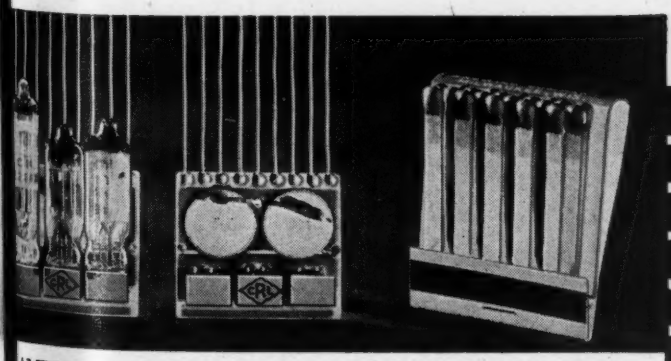
Pentode couplates are complete interstage coupling circuits consisting of 3 capacitors and 3 resistors on a small 6 lead ceramic plate. Compared with old-style audio circuits, they actually reduce soldered connections 50%—wiring errors accordingly. Technical Bulletin 42-128.

28% Less Soldered Connections With NEW FILPLATE



FILPLATES (2 resistors and 2 capacitors) for bypass and filter application in TV, FM and AM, where filter networks of comparable component values and layout are needed. Smaller than special delivery stamp. Save vital low wattage resistor stocks. Technical Bulletin 42-131.

Standard Model 2 AMPEC Miniature 3 Stage Speech Amplifier



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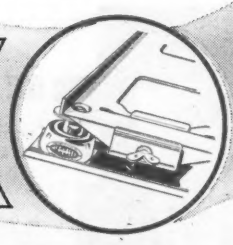

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TELE-TIPS

ANTENNA TUNING SYSTEM designed by the Naval Research Laboratory, automatically matches input impedance of a 35-foot whip-antenna to a 50-ohm coaxial transmission line over "frequency range of 2 to 18 MC. Although designed specifically to operate with standard Navy transmitter of 400 watts output, the design is applicable to a wide variety of automatic impedance-matching problems with only minor variations.

CAPACITOR units in some of the Signal Corps equipments show practically no change in capacitance over a very wide temperature range. The requirements of one of their specifications for small fixed capacitors with ceramic dielectric are such that the measurement calls for the assured observation of a capacitance smaller than 0.03 mmf. Approximately this is the capacitance of a metallic hair, 0.005-inch in diameter, and less than ¼-inch long.

PROJECTION COLOR-TV by the revolving-disk method, is now being developed by one important laboratory near New York. This home receiver is expected to be publicly demonstrated in the near future, showing that, despite light losses in the color-disk, adequate screen illumination can be obtained.

TV AT 20,000 FT.—The first attempt to receive television aboard a transpacific Hawaii-bound airliner recently succeeded on United Air Lines' Flight 49, outbound from San Francisco. The joint experiment was conducted by technicians of United and KRON-TV of San Francisco, using a three-year-old RCA table model with a 10-inch screen. Richard Grace, United radio engineer who monitored reception of a KRON-TV newscast, reported that the program came in clear while the Stratocruiser prepared for take-off. The image grew fuzzy during take-off but as the plane gained altitude it sharpened. Reception at 20,000 feet was perfect for 250 miles west of San Francisco, Grace said. Beyond that mark the signal grew weak and finally faded out, 306 miles from the Coast.

(*Continued on page* 14)

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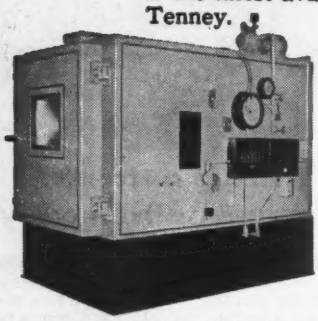

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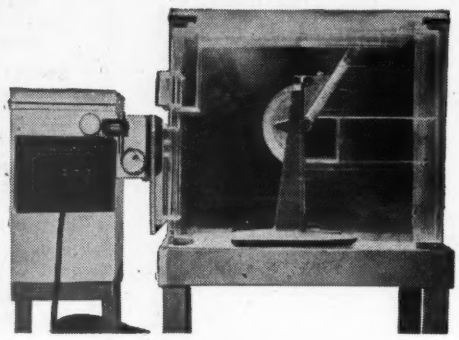

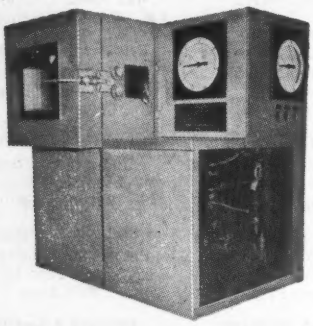

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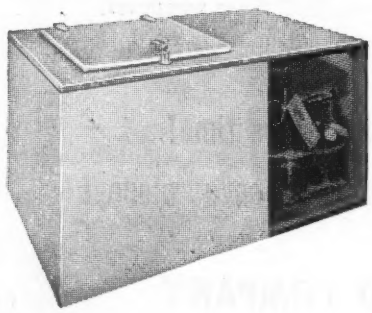

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TELE-TIPS

(*Continued from page* 6)

PRINTING COLOR-TV—By the grapevine, we learn that in a New York print shop in the spring of 1950, experiments were conducted for RCA, looking to mass production of color-tube plates. Patterns of small dots were printed on glass sheets, using rubber plates, employing three types of phosphor pigments, similar to printing three-color pictures. Each set of dots was not to coincide with any of the other sets of dots. These experiments were successful, from the printing standpoint, and a number of such printed-phosphor glass plates were made. Other experiments were then carried on to do similar printing via the silk-screen process. The phosphor pigments used in printing were supplied by RCA. In daylight, all the material was white to the naked eye, but was said to glow blue, red and green, according to its type.

RADIO CHAOS IN EUROPE?—Last year, the nations of Europe agreed on a radio allocation for the Continent known as the Copenhagen Plan, charted on page 35 of August TELE-TECH. But now (it is claimed by the Iron Curtain countries) U. S. stations in the Occupation zones are disregarding the Copenhagen allocation and are operating powerful broadcast stations on any channel at will, making the night air of Europe an intolerable chaos, reminiscent of the U. S. radio chaos of 1926, and spoiling radio listening for France, Belgium, and Holland, as well as the Communist countries. Frantic complaints are printed in the last issue of Organisation Internationale de Radiodiffusion's "Documentation and Information Bulletin," from Prague, Czechoslovakia.

MARCONI'S "WHY?"—Hitherto unpublished correspondence of Guglielmo Marconi has been incorporated in a new booklet written by Orrin E. Dunlap, Jr., vice president of RCA. Unfolded here is story of Marconi's yearning to learn the mysterious cause of the great invention he fathered. "Indeed, the 'why' of radio continually challenged Marconi," Mr. Dunlap writes. "After a night of vigil in long-distance test of wireless between the English Channel and Australia, he turned to his friend David Sarnoff on board the Elettra (Marconi's yacht) and with a perplexed expression remarked: 'There is one thing I would like to know before I die—why this thing works!'"

(*Continued on page* 20)

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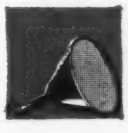

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TELE-TIPS

(*Continued from page* 14)

COLOR FILMS are still under 20% of the total feature pictures produced by the movie industry, according to the Motion Picture Production Encyclopedia. In 1943, the color percentage was 4.3%; '44, 5.8%; '45, 7.8%; '46, 8.1%; '47 11.2 %; '48, 16.4%; '49, 14.5%; '50, 19.6%. The first color picture was produced in this country in 1917.

MUSIC "FOR FREE" from the air is available for many residents of large apartment houses. Although usually unknown to many such residents in numerous cities, local and national background music services use carrier-current equipment for supplying music to large blocks of apartments. Hence it is often possible for the non-paying outsider to tune in to those programs at the high or low end of the band, and avail himself of free music!

PORTABLE TV-SET called "Tele-Scope" and contained in a suitcase, is being developed by Thompson L. Guernsey, R4A, 349 E. 49th st., New York 17, well-known radio figure of Dover-Foxcroft, Maine. The small picture tube, viewed through lenses, gives impression of a huge 8 x 12 ft. screen, 30 ft. distant. Set operates from 110-volt AC circuit. Provided with earphones it permits one-person viewing without disturbance to others. Also proposed for hospital and disabled-veteran viewing, police cars, beauty shops, airplanes, etc. Estimated retail price, about $150.

SUMMER is the TIME when people often come to hate radio. Hot weather means open windows, open windows mean radio "noise" percolating into adjoining apartments. Now that television programs continue as late at night as radio programs—and even later in some cases—a very real problem is sometimes posed by thoughtless neighbors. We wonder whether the FCC would sanction the manufacture and sale of miniature transmitters covering the TV channels, and with a built-in microphone by means of which sufferers could "sit on" the station of the offenders' choice and tell him more or less politely to "turn it down". We feel somehow, that the days of connecting the spark side of a *Ford* coil to a piece of wire as means of shutting up the offenders, are over!

TELE-TECH

TELEVISION • TELECOMMUNICATIONS • RADIO

O. H. CALDWELL, Editorial Director ★ M. CLEMENTS, Publisher ★ 480 Lexington Ave., New York (17) N. Y.

Radio-TV's Outlook Abroad

Opportunities for AM, FM, UHF and Microwave in the World At Large

Most American radio men are so busily occupied in radio-equipping our own communities and our own continent that they give little thought to the big job that remains to be done to fit out the rest of the world with AM, FM, TV, UHF, microwaves, and all the rest of our diversified radio facilities.

The figures on the front cover of this issue will come as a surprise to many readers. Repeating them here, for your convenience:

The Western Hemisphere, with only 14% of the world's population, has 75% of the world's transmitter power; 75% of the world's tube sockets, and 97% of the world's television sets.

★ ★ ★

Let's take a similar comparison of present *world* radio statistics measured against our own USA. This affords an even more striking contrast of the tremendous and intensive radio development of our own continental area, as compared with the rest of the world:

The United States, with only 7% of the world's population, has 65% of the world's transmitter power; 70% of the world's tube sockets, and 98% of the world's television sets.

★ ★ ★

For many years your present publishers have compiled U.S. and world statistics on radio sets in use. These figures in their latest form, show that all the rest of the world has not yet caught up in radio receivers (92,000,000) to our own total (95,000,000).

And a world census of television sets shows how far, in this newest application, we have outstripped all other nations: U.S. 13,000,000; Great Britain 700,000; Canada 60,000; France 30,000; Russia 25,000; Mexico 20,000; Germany 20,000.

We need to remember that the radio spectrum, as we know it, is not limited merely to our own continental borders, but extends, with equal effectiveness all over this old globe. And soon even American TV programs may be short-waved to Europe by a series of "Stratovision" jumps between U. S. flat-tops!

American Radiomen must get to thinking hemispherically and world wide.

The rest of the world needs and wants what we have to offer.

The RADARSCOPE Revealing at a Glance

PENTAGON

AIR FORCE PROGRAM FOR 1951—The electronics-radio-radar manufacturing industry will have a most substantial increase in assignments from the air Force and from the Naval Aeronautics Bureau in the current program of the Joint Chiefs of Staff for a 75-per-cent expansion of military aircraft during the next fiscal year—July 1, 1952, to June 30, 1953. The boost will be from the currently projected 95-group strength of the Air Force to 138 or even 150 groups, and this would mean another 60-billion-dollar military budget. Although the program is not yet firmed—and might even be reduced by 15 billion dollars if the international situation calms—such a budget would mean the expenditure of probably more than $3 billion for electronic equipment for the military aircraft.

FCC

TV "FREEZE" THAW—With the FCC decision to commence immediately the cracking of its three-year-old "freeze" on the construction of new television stations through the consideration of applications for "temporary" power increases on a case-by-case basis, the outlook is for a full lifting of the "freeze" by early next year. With that road-block pushed aside, construction will be commenced or will be completed before the end of 1952 on at least fifty new TV stations (or about half as many as the existing 107 stations now on the air). FCC and television-industry authoritative sources estimate the expenditure for the new television-station equipment and construction will aggregate next year up to $17.5 million.

The Weatherhead plant in Cleveland has adopted "Handie-Talkie" portable radiophones in a production-control system that results in complete minute-to-minute data on all projects being handled. Men with Motorola portables move along the production floor and continuously report into the control center on the activities at each production point. By the combination of these reports, the company knows immediately the status of any contract in the building.

EXPORT

LATIN-AMERICA—It is not often realized just what a large market is offered to North American radio manufacturers by the Central and South American countries. At the present time there are over 1700 radio broadcasting stations in the lower part of the American continent. Many of these are of much higher power than corresponding stations in the US. These stations offer a valuable replacement market for radios as well as transmitting and studio equipment, and in most cases currency restrictions can be overcome. Many of these stations are high-frequency operations due to the nature of the terrain to be covered and the large areas. But most listeners are in range of one or two broadcast-band stations. Here would seem to be a market for the now-out-of-date all-wave receivers of a decade ago. Here too, is a heaven-sent opportunity for frequency modulation to find its own niche in the world. The static encountered in many parts of the southern continent makes AM useless for more than a few miles.

COMPONENTS

RECTIFIERS—While most parts and components for TV sets are now in ample supply as a result of the receiver-makers' currently reduced output, there seems to be one component shortage which may yet further restrict the manufacture of finished TV sets. This is the shortage of selenium for rectifiers, now in increasing demand for radio-TV as well as heavy-current electrical uses. Selenium is recovered from the slimes of copper-refinery wastes, and its fixed output is already far behind American industry's needs, particularly for defense applications. New sources are being opened up, as new refiners get into operation. But rectifier engineers predict that with their product preempted for heavy-industry applications from now on, selenium rectifiers will prove to be a bottle neck, holding down radio-TV manufacturers' civilian production during the balance of '51 and '52.

AVIATION

AGAIN RADIO comes to the rescue of the aviation industry. Since the very beginning of commercial air operations radio has been its guide and mentor. Now, today, radio aids are being used to bring down safely huge airliners—and small private craft—which ten years ago would have turned to an alternate base without a second thought. The latest development in radio safety equipment for airlines came with the installation of 40 new electronic auto-pilots manufactured by the Sperry Company, in Convairs of United Air Lines. These new auto-pilots actually take over and fly the aircraft into the traffic pattern of an airfield and put it on the instrument approach. This reduces the strain on the pilot who is able to concentrate

on other cockpit duties incidental in making a blind approach and who is then "handed" a perfectly trimmed aircraft flying on the proper heading just before touch-down. It will be only by the introduction and satisfactory development of such equipment that commercial aviation can offer reliable service.

COLOR-TV

NAME, PLEASE! Already a number of different titles have been proposed for the united-industry compatible color-TV system on which NTSC is working. These proposals include: sub-carrier multiplex color-TV; shunted monochrome TV; compatible monochrome TV, to which color is added by subcarrier multiplex; chromatized monochrome; compatible color-TV; color monochrome parallel system; and N.T.S.C. compatible color-TV system.

Above all, it appears necessary to find a simple natural term which will correctly interpret the NTSC system to the FCC and the public. Even the word "compatible" has been questioned, as meaning little to the layman. A simple self-explanatory label will help mightly when it comes time to sell the new color-TV system to the American public.

ALLOCATION

TROPOSPHERIC INTERFERENCE coming in from stations 1000 to 1500 miles distant, has been very pronounced this past summer and well illustrates the DX performance of which the VHF TV channels are capable when conditions, such as temperature-inversions, etc., are just right. But this annoyance of the past two months also demonstrates that merely increasing co-channel station separation, from 200 miles to even 250 miles or 300 miles, is not going to solve the problem of tropospheric interference when Old Mother Nature decides to turn it on. For complete protection we would need 1500 to 2000 miles separation, and obviously that is too high a price to pay. Tropo TVI which can't be cured, will simply have to be endured!

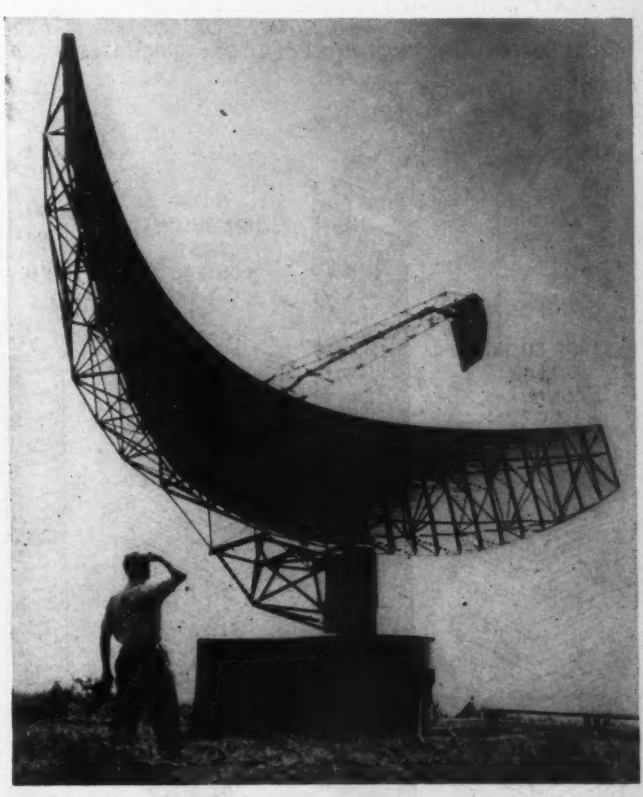
INTERNATIONAL

TELEPHONY will be the future voice of the airlines if the long range plans of the International Civil Aviation Organization mature, and radio telephony is used to replace radio telegraphy on international air routes. This will be the culmination of three years of planning for radio telephony; use in long-range aviation. It has already been used considerably by Pacific flights and now extensions of the service to Australia are planned. The problem of language difficulties has not yet been solved, but interpreters at regional stations may be the answer. In any case it is probable that the increased efficiency of radio telephony will more than outweigh the minor inconvenience of interpretation.

UHF-TV

TOP-FLOOR HOTEL-ROOM demonstrations do not properly show the expected performance of UHF-television reception in the average home living room, —it is frankly admitted by many of the engineers who took part in the recent Bridgeport FCC tests. With sets in upper-floor direct-view of the UHF transmitter only 4 miles distant, reception conditions were at their best, and the FCC Commissioners (and others) probably got an exaggerated idea of UHF's merits from comparing such reception with VHF from 56 miles distant. The real demonstration of UHF performance will be to test out UHF-adapted receivers on the ground floors of homes in average residential communities, at 10 to 20 miles from the UHF transmitter. We will then know better what to expect, in the face of down-lead difficulties, building obstructions, hills and valleys, and the steel barriers of downtown and industrial areas.

A valuable report on such everyday UHF-TV reception in New Haven, 18 miles from Bridgeport, is contained in the communication from Rudy Frank, of Station WELI, on a following page. Mr. Frank's testimony on UHF-TV results in remote ground-floor locations, both business and residential, is timely and important.



Harbor radar, constructed for the port of Le Havre, France, by Raytheon, being tested out in Boston Harbor. Radarscopes show every ship and shore feature, through thickest fogs, so that harbor-master can instruct ships' captains how to move safely to their docks, by a process of "talking the ship in" as used for airplane landings.

DEFENSE CONTRACTS— Who Gets the

Defense Budget for two fiscal years 1951 and 1952 totals $72 billion for hard goods only (military equipment).

Deliveries in fiscal year 1951 total $11 billion; may total $38 billion for two fiscal years 1951 and 1952.

Full impact of defense requirements may reach its peak in the spring of 1952; may carry over for several years, depending on the world military situation.

Department of Defense spot-checks reveal nature of procurement actions by Army, Navy and Air Force.

TELE-TECH analysis shows small firms receiving 39.4 percent of Army and Navy's defense dollar.

Some electronic contracts are analyzed—figures speak out.

By Lt.-Col. STANLEY GERSTIN
Manager, Government Manuals Division
Caldwell-Clements, Inc., New York City

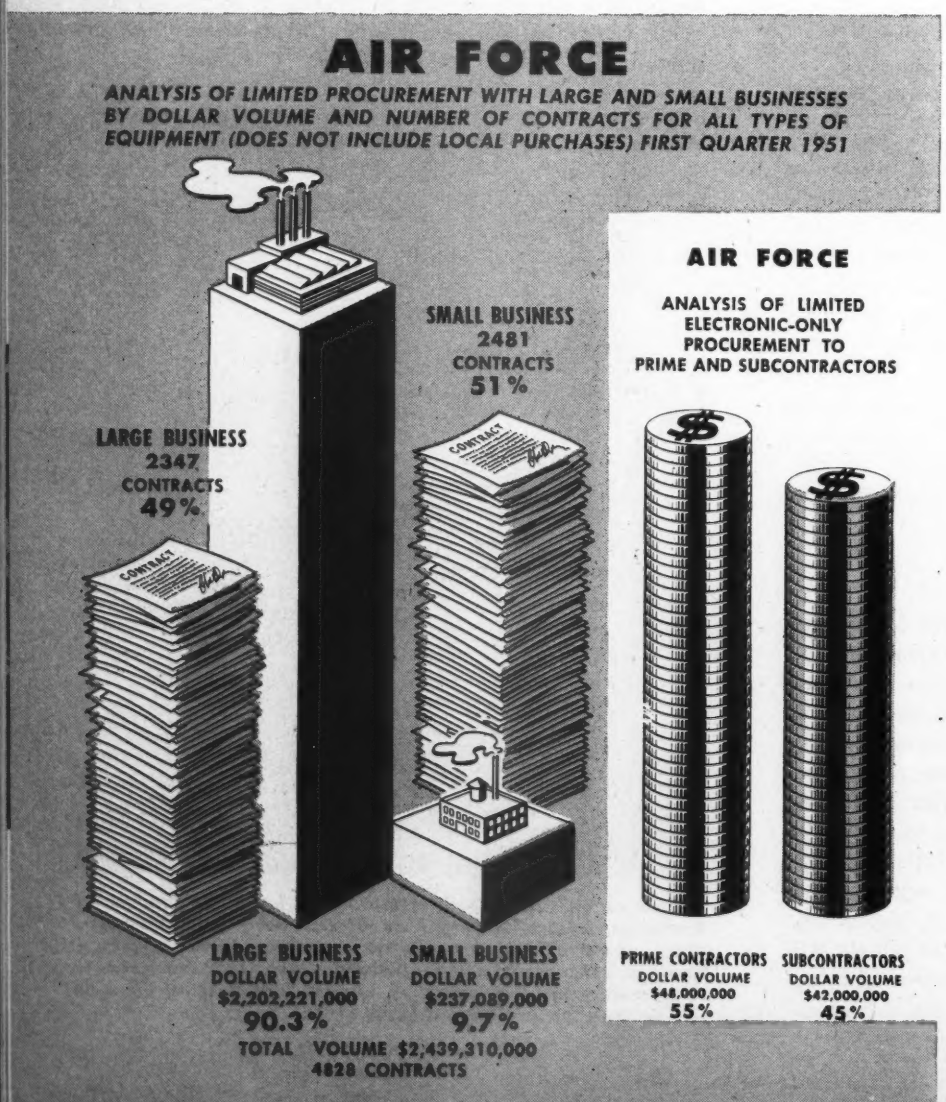
$72 BILLION IS A LOT OF money to distribute among American business for military equipment. Yet, this is the estimated amount which will be spent by the Department of Defense for hard goods (military equipment) during the two fiscal years, 1951 and 1952.

This does not mean that American industry will produce $72 billion worth of military goods by the end of 1952. Actually, deliveries of military equipment in the fiscal year 1951 have been estimated to total $11 billion. Deliveries of military equipment in the fiscal year 1952 may total $27 billion—making a total of $38 billions for the two-year fiscal period.

This does mean that the full impact on American industry for defense production is yet to come—and may reach its peak in the spring of 1952; it also means that the effect of military contractual commitments to be made during 1952 will carry-over for several years thereafter, depending upon the world military situation.

Reflecting the radio - electronic equipment industry's interests, TELE-TECH has undertaken to analyze statistical data from the Air Force, Navy and Army in an effort to reveal where military business is going, how much dollar volume is going to large and small business firms, how well the Department of Defense is succeeding in spreading business throughout the industry, and, particularly, how successful is the program for distribution of defense business among radio-electronic manufacturers.

The charts on these pages are exclusively prepared and published by TELE-TECH from data furnished by the military services and reveal the results of analysis of limited pro-



Business?

curement studies for the periods shown.

It is of interest to note that while the Air Force has achieved an equitable division of contracts among large and small businesses, as may be seen in the Air Force chart, this information tends to cloud the fact that the dollar value of the contracts awarded to small business is considerably less than that awarded to large business.

In a special analysis of $90 million in electronic procurement, made by the Air Force over a limited period, the dollar value of contracts to large and small business was almost equally divided. While this presents a favorable picture, it is prudent to observe that this particular limited study of electronic procurement is not sufficiently large to project an estimate of all electronic procurement.

The Army procurement chart reflects a better picture of procurement since the study covers more than $7.6 billion in contractual obligations. A special study of Signal Corps procurement, which is more applicable to the radio-electronic industry, reveals the distribution of contracts and dollars to large and small radio-electronic manufacturers. This limited procurement study is consistent with the present trend in military procurement throughout these services.

The Navy chart discloses that the distribution of defense contracts among small business represents nearly two-fifths of all Navy procurement.

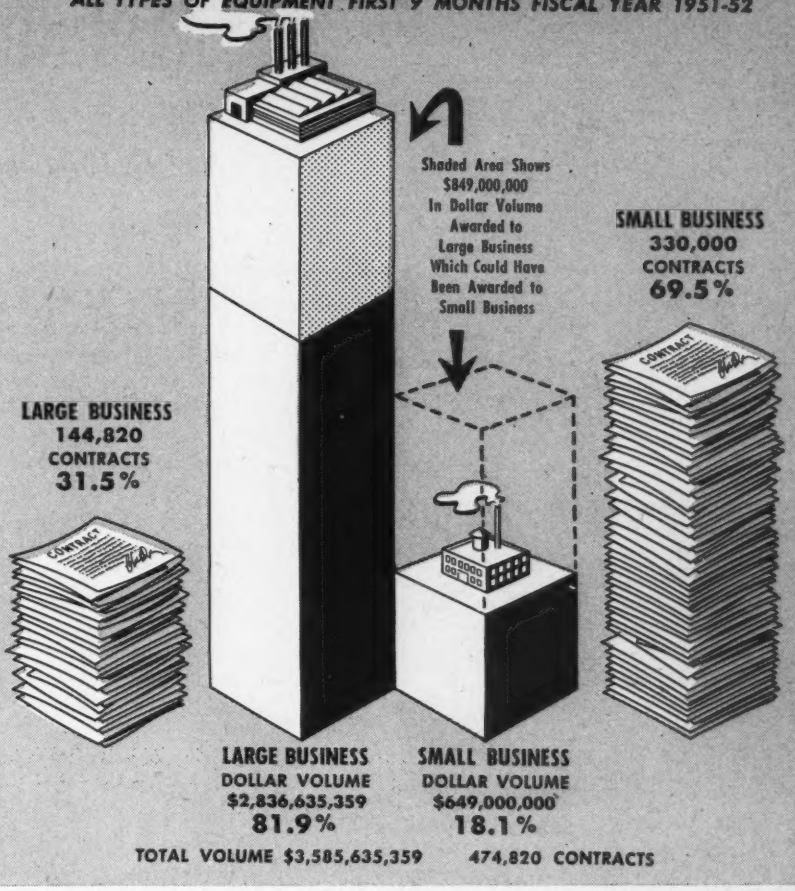
Of special interest is the fact that a considerable portion of the defense equipment dollar could have been given wider distribution throughout all industry, as well as throughout the radio-electronic industry, since much of the business awarded to large firms could have been handled by small firms. In this respect, the Army chart reveals that nearly $4 billion of the total amount analyzed could have been awarded to small business. Of the $3.5 billion in procurement actions analyzed in the Navy chart, small business received $649 million, whereas an additional billion dollars worth of equipment actually lent itself to production by small manufacturers.

The procurement studies on these pages are limited in the number of contracts involved and dollars spent. They do represent a total of $13,685,000,000 in defense contracting. This is 1/3 of the dollar value of expected delivery of finished military equipment for the two fiscal years of 1951 and 1952. Consequently, it is reasonable to consider these pro-

(*Continued on page* 76)

NAVY

ANALYSIS OF LIMITED PROCUREMENT WITH LARGE AND SMALL BUSINESSES BY DOLLAR VOLUME AND NUMBER OF CONTRACTS FOR ALL TYPES OF EQUIPMENT FIRST 9 MONTHS FISCAL YEAR 1951-52

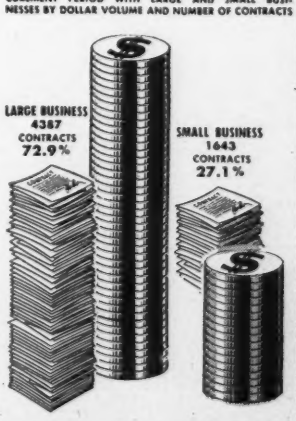

Shaded Area Shows $849,000,000 In Dollar Volume Awarded to Large Business Which Could Have Been Awarded to Small Business
LARGE BUSINESS 144,820 CONTRACTS 31.5%
SMALL BUSINESS 330,000 CONTRACTS 69.5%
LARGE BUSINESS DOLLAR VOLUME $2,836,635,359 81.9%
SMALL BUSINESS DOLLAR VOLUME $649,000,000 18.1%
TOTAL VOLUME $3,585,635,359 474,820 CONTRACTS

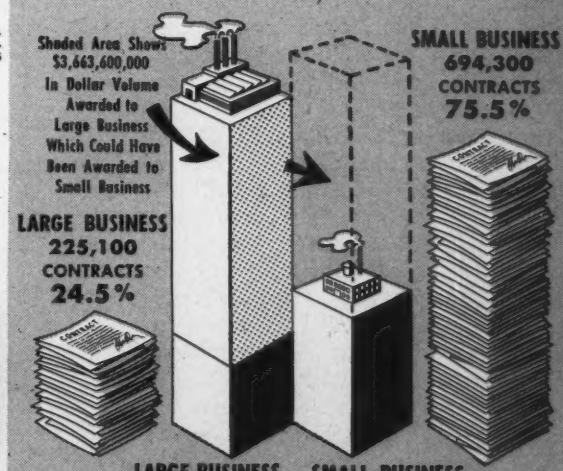
ARMY

ANALYSIS OF LIMITED PROCUREMENT WITH LARGE AND SMALL BUSINESSES BY DOLLAR VOLUME AND NUMBER OF CONTRACTS FOR ALL TYPES OF EQUIPMENT FIRST 9 MONTHS FISCAL YEAR 1951-52

SIGNAL CORPS

SPECIAL ANALYSIS OF SIGNAL CORPS-ONLY LIMITED PROCUREMENT PERIOD WITH LARGE AND SMALL BUSINESSES BY DOLLAR VOLUME AND NUMBER OF CONTRACTS


LARGE BUSINESS 4387 CONTRACTS 72.9%
SMALL BUSINESS 1643 CONTRACTS 27.1%
LARGE BUSINESS DOLLAR VOLUME $30,617,700 72.8%
SMALL BUSINESS DOLLAR VOLUME $11,401,000 27.2%
TOTAL VOLUME $42,018,700 6030 CONTRACTS


Shaded Area Shows $3,663,600,000 In Dollar Volume Awarded to Large Business Which Could Have Been Awarded to Small Business
SMALL BUSINESS 694,300 CONTRACTS 75.5%
LARGE BUSINESS 225,100 CONTRACTS 24.5%
LARGE BUSINESS DOLLAR VOLUME $5,312,600,000 69.3%
SMALL BUSINESS DOLLAR VOLUME $2,348,600,000 30.7%
TOTAL VOLUME $7,661,200,000 919,400 CONTRACTS

Measuring Television

New unit, used in conjunction with general

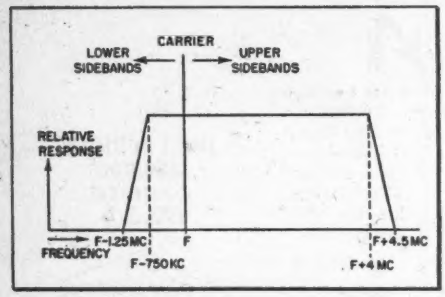


Fig. 1: Ideal television channel transmission amplitude characteristic

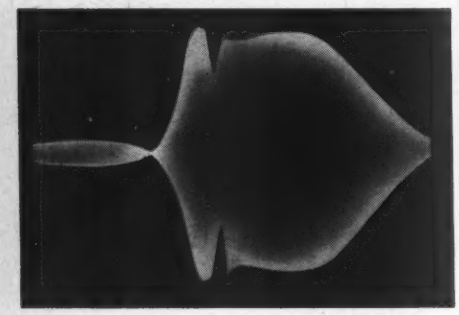


Fig. 3: Photo of the pattern obtained on the screen of the oscillograph

By JOHN RUSTON
Television Transmitter Division
Allen B. Du Mont Laboratories, Inc.
1000 Main Ave., Clifton, N. J.

THE transmission amplitude characteristic of a television picture transmitter has usually been measured by a point by point method in which the transmitter is modulated with a sinusoidal voltage of constant amplitude. The relative amplitudes of the lower and upper sideband voltages appearing at the transmitter output are then measured with a field intensity meter which has suitable selectivity. Measurements are generally made for a range of modulation frequencies extending up to about 5 MC so that the sidebands cover a range from 5 MC below to 5 MC above the carrier frequency. These measurements show how closely the transmitter response corresponds to the "ideal" shown in Fig. 1.

The main requirements are: (1) The response at frequencies lower than F — 1.25 MC shall be less than — 20 db in order to avoid interference with the lower adjacent channel, (2) The response from F — 750 KC to F + 4 MC shall be substantially uniform in order to obtain a uniform overall video frequency response when the transmission is picked up by a normal receiver. Owing to these two important requirements, it is necessary to measure the transmission amplitude characteristic quite frequently during the design and testing of a transmitter, and it is also desirable that a transmitter in service should have this characteristic checked periodically.

Transmitter Response

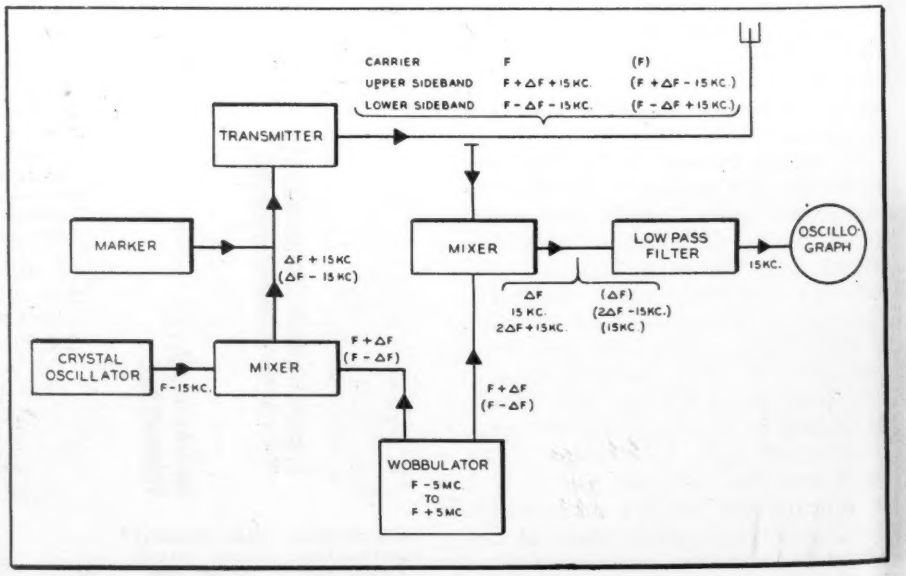
Since the transmitter response is determined largely by the adjustment of the broadband r-f circuits in the final amplifier and preceding linear amplifier stages, it is desirable that an operator shall have some means of observing the response when tuning these circuits. This is particularly so in the case of transmitters employing more than one broadband r-f stage; consequently, transmitters of this type frequently have a built-in r-f wobbulator which enables the response of each broadband stage to be observed by means of a cathode ray oscillograph.

The wobbulators presently in use for this purpose feed a swept r-f signal to the appropriate amplifier input and the circuits are then tuned by observing an oscillograph pattern representing the amplitude of the signal appearing at the amplifier output. This wobbulation serves as a useful guide when tuning the transmitter, but it does not give a true picture of the transmission amplitude characteristic since the transmitter is not operating under normal conditions of modulation and r-f drive. It is thus necessary to use some method of sideband measurement for checking the characteristic of a transmitter during design and testing or for the periodic checking of a transmitter in service.

The point by point method described previously is laborious and requires rather costly equipment, and so there seems to be a need for a simple sweep method which can be used in conjunction with a general purpose cathode ray oscillograph. Such a sweep method will be described in this paper, and it will be seen that a unit employing this method of measurement can also be used to replace the r-f wobbulators.

Referring to the block diagram in Fig. 2, the wobbulator is a radio frequency oscillator whose frequency is swept from F — 5 to F + 5 MC,

Fig. 2: Block diagram showing the principle of the system's operation



Transmitter Amplitude Characteristics

purpose oscillograph, provides relatively simple method for determining responses

where F is the carrier frequency of the transmitter to be tested. A signal from the wobbulator is mixed with the output of a crystal oscillator whose frequency is slightly lower than the transmitter carrier frequency, i.e., F — 15 KC. The difference frequency output from the mixer is in the video frequency range and sweeps from approximately 5 MC to zero to 5 MC for each sweep of the wobbulator. This difference frequency is fed to the video input terminal of the transmitter. Another signal from the wobbulator is fed to the second mixer which is coupled to the output transmission line of the transmitter. The difference frequency output from this mixer is passed through a low pass filter and fed to the vertical deflection terminal of the general purpose cathode ray oscillograph.

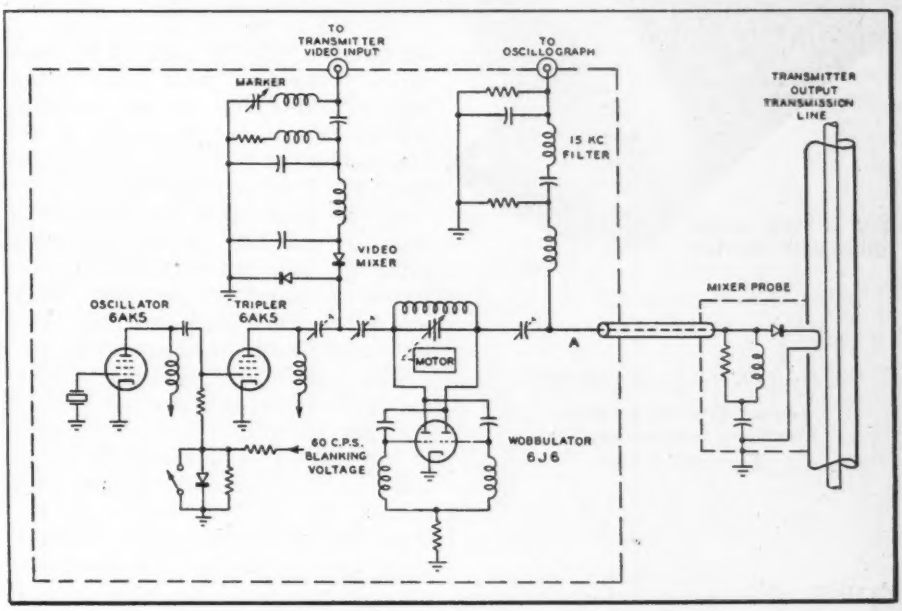


Fig. 4: Simplified schematic diagram of the system

Frequency Formulas

At any instant when the wobbulator frequency is $F + \triangle F$, the frequencies present in the various parts of the circuit are given by the first set of symbols. The transmitter input frequency is $\triangle F + 15$ KC and the transmitter output consists of the carrier frequency F, an upper sideband frequency $F + \triangle F + 15$ KC and a lower sideband frequency $F - \triangle F - 15$ KC. The difference frequency output from the second mixer has three components: F, 15 KC and $2 \triangle F + 15$ KC due to beats between the wobbulator frequency and the carrier, upper sideband and lower sideband respectively.

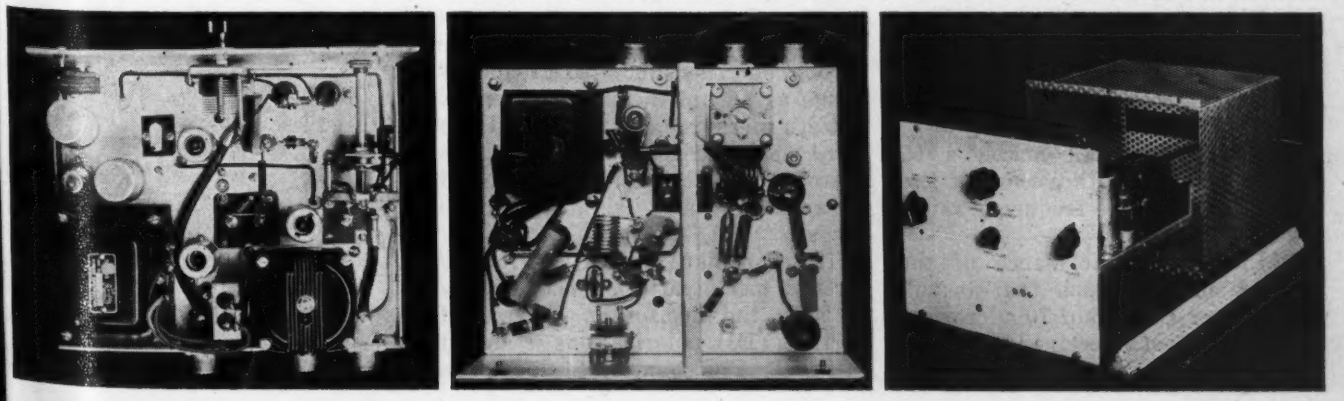
When $\triangle F$ is substantially greater than 15 KC, the first and third frequencies are removed by the low pass filter and only the 15 KC signal is passed on to the oscillograph. It can easily be arranged that the amplitude of this 15 KC signal shall be proportional to the amplitude of the upper sideband at the transmitter output.

When the wobbulator frequency is lower than the carrier frequency, i.e., $F - \triangle F$, then the frequencies present in the circuit are given by the second set of symbols (in brackets). In this case, the 15 KC output from the second mixer is proportional in amplitude of the lower sideband output from the transmitter.

It is thus seen that the wobbulator frequency tracks the upper and lower sidebands in turn at a frequency separation of 15 KC. The horizontal sweep of the oscillograph is synchronized with the wobbulator sweep and then the pattern obtained on the oscillograph screen is a 15 KC waveform, the envelope of which shows the transmission amplitude characteristic of the transmitter. A photograph of such a pattern is shown in Fig. 3. The individual cy-

(*Continued on page* 69)

Figs. 5-7: Photographs showing (left) top view, (center) bottom view and (right) overall view of the unit



Glide Path Cavity Antenna

Horizontally-polarized, zero-drag, 329-335 MC unit Receives signals from any forward direction and

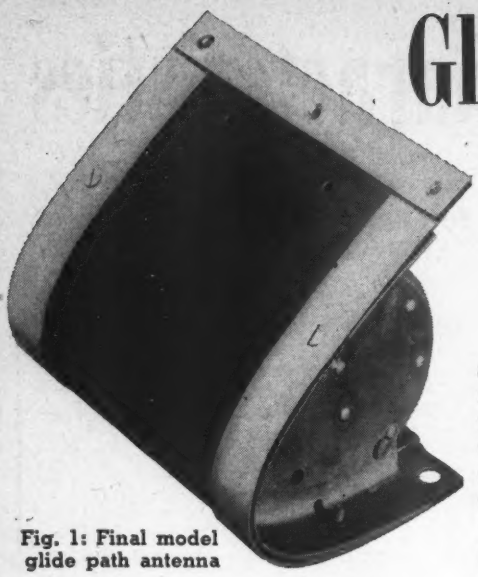


Fig. 1: Final model glide path antenna

By LOUIS E. RABURN
Senior Antenna Engineer
Electronics Research, Inc.
Evansville, Ind.

THE cavity-type antennas have been employed during the past few years as marker beacon antennas when mounted on the belly of the aircraft[1] and as a glide path antenna when mounted in the nose of a transport type aircraft. In general the cavity antenna has a rather narrow comparative bandwidth but in these two applications it was found possible to obtain sufficient bandwidth for reliable performance with careful attention to design parameters.

When it was required to develop a zero-drag glide path antenna for installation on a Jet fighter made by North American Aviation, Inc., it was decided to investigate the radiation characteristics of a cavity antenna located in the leading edge of the air intake lower lip. The specific electrical requirements for this antenna are as follows:

1. The antenna shall receive horizontally polarized and horizontally propagated radio signals with minimum practicable reception of vertical polarized radio signals.

2. The input shall match a 52 ohm coaxial line with a vswr of less than 5 to 1 over the frequency range 329 to 335 MC.

3. Electrical performance of the antenna shall be such that it will provide an r-f signal of 70 microvolts to the glide path receiver when the aircraft is on a standard USAF instrument approach path 10 or more miles from the glide path transmitter and flying at any heading within 60° of the direction of the transmitter and at any altitude less than 10° from normal flight.

4. The pattern of the antenna in the forward half of the horizontal plane for any aircraft altitude between horizontal and 20° bank, glide, or climb shall be free from nulls and sharp variations in gain.

The structural design requirements for the antenna are that it be light in weight and the method of fabrication and assembly adaptable to aircraft production techniques. In addition, it was considered very desirable if the antenna could be constructed and assembled on a production line basis without any need of post-assembly tuning adjustments.

Radiation Pattern Study

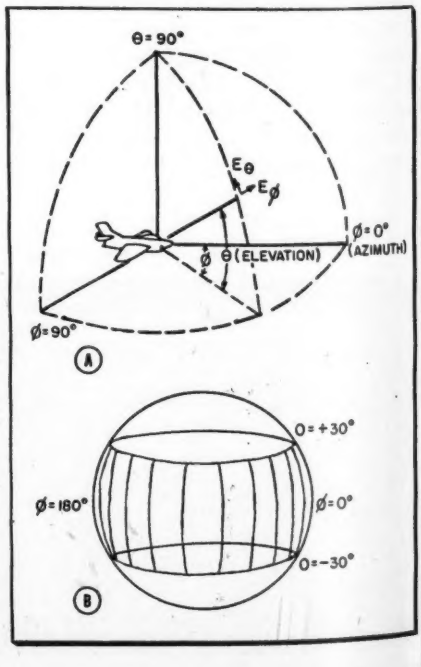
The first step in the development of this antenna was to make a radiation pattern study using scale-model techniques to determine whether or not a cavity type of antenna at this location would meet the pattern requirements previously specified. This radiation pattern study was made using the 1/10th-scale precision model of the aircraft shown in Fig. 3. This scale model is made of wood and was metal sprayed with a prime coat of zinc and a finish coat of copper to provide a highly conducting metal surface. A 1/10th-scale model of the glide path cavity antenna was mounted in center of the lower lip of the air intake and soldered to the copper surface of the model. This model antenna was matched to a vswr of 5 to 1 or better throughout the simulated frequency range as an aid in making accurate pattern measurements. The patterns were measured using a linear superhetrodyne system, and were plotted on a voltage basis using a polar recorder.

The coordinate system used for the aircraft model pattern measurements of both the horizontal, (Eφ), and vertical, (Eθ), polarizations is shown in Fig. 2. The equatorial belt for the region of greatest operational interest is shown in Fig. 2A. In order to present the pattern data most clearly, the final sets of relative patterns were integrated and converted into patterns of equi-signal contours in the equatorial belt of the aircraft.

A preliminary set of spherical radiation patterns was measured for both horizontal and vertical polarization at the band-extreme frequencies of 329 and 335 MC. The sets of patterns at both frequencies are practically the same, and they both show that the radiation pattern characteristics of the cavity antenna in the air-intake lip location are very favorable. After it was determined that the radiation patterns did not vary appreciably between the two ends of frequency band, a complete set of spherical radiation patterns was measured for both horizontal and vertical polarization at 332 MC. The patterns at this frequency are practically the same as the patterns at 329 and 335 MC, and the principal-plane patterns for 332 MC are shown in Fig. 4.

Fig. 4 shows that the pattern for

Fig. 2: (Above) Radiation pattern coordinate system Fig. 2A (Below) Equatorial belts for region $\theta = +30°$ to $-30°$



for Jet Fighter Aircraft

PART ONE OF TWO PARTS

fits into lower lip of air intake
has a VSWR of better than 5 to 1

Fig. 3: Scale model aircraft

horizontal polarization consists primarily of a single lobe that is broad in the horizontal plane and directed forward in the line of flight. The patterns for vertical polarization show that for any given direction in the forward hemisphere of the aircraft, the component of vertical polarization is never more than one-fourth as much as the component of horizontal polarization. The shape of the pattern in the horizontal plane for vertical polarization suggests that most of the vertically polarized radiation is caused by the flow of currents on the vertical front-surfaces of the air inlet.

Operational Performance

In order to determine the operational performance of the antenna system at the required maximum distance of the glide path transmitter, the complete set of relative patterns for both horizontal and vertical polarizations at 332 MC was integrated by means of a polar planimeter and computations were made to obtain the average value of the relative patterns.[2] This average value gives the scale factor for converting the relative measured patterns into absolute directivity patterns. The conventional way to present the absolute directivity patterns of both transmitting and receiving antennas is to assume that the antenna is used to radiate the power of a one watt transmitter, assuming also that there is no mismatch loss or ohmic loss in the antenna system.

For this transmitting case, the equi-signal contour diagram at 332 MC for cone angles (from +30° to −30°) vs azimuth of the aircraft is shown in Fig. 5. The equi-signal contours are formed on the diagram by connecting points of equal field strength for the azimuth and cone angles shown by the appropriate cone angle patterns.

This equi-signal contour diagram can be employed, together with propagation data for the specified frequencies, performance of the transmitter, performance of the receiver, etc., to compute the receiver input signal at any specified range and altitude of the aircraft.

The computations to determine the received signal when the aircraft is 10 miles away from the AN/CRN-2 transmitter are shown in the appendix. These computations are based on the propagation data given in the book "Propagation Curves", NDRC Report No. 966-6C by Bell Telephone Laboratories. The appropriate as-

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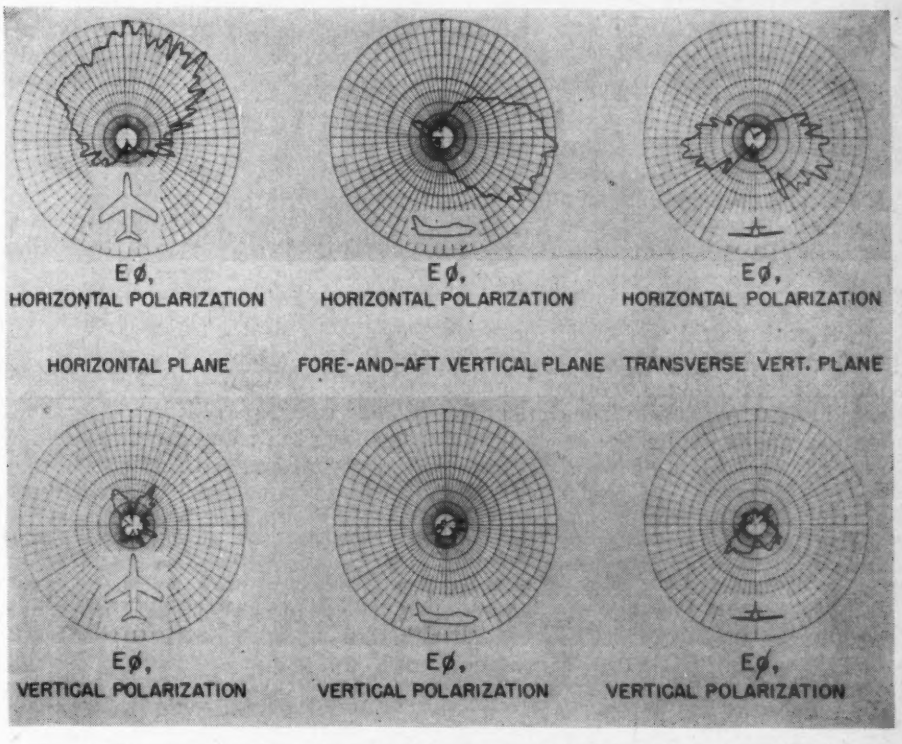
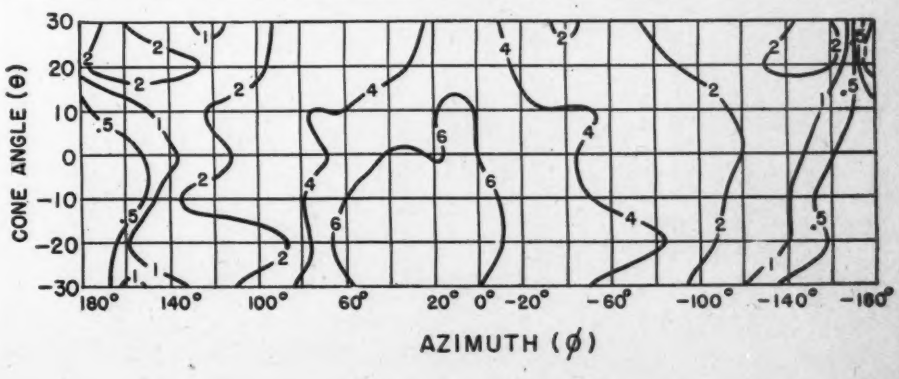


Fig. 4: Diagrams showing principal-plane patterns of glide path cavity at 332 MC

Fig. 5: Equi-signal contours in equatorial belt. Contours show field strength in millivolts/meter at one mile assuming one watt is radiated by antenna. Frequency is 322 MC, horizonal polarization in level flight is (EØ). Required field strength on this diagram for minimum receiver signal of 70 μv. is 1.26 millivolts/meter. (Appendix)



Simplified Operation

Improved circuits, servo-controlled ing iris, and lens change among the

Photo showing the external appearance of newly designed camera equipment

R. L. GARMAN, Technical Director
General Precision Laboratory Inc., Pleasantville, N. Y., and

J. E. COPE, Engineering Mgr.
Television Division, Pye, Ltd., Cambridge, England

TODAY'S trend in TV broadcast equipment design is toward operational simplification, reduction of the number of equipment units, and the development of remote control devices which put a greater degree of picture quality control in the hands of the camera control unit operator while still providing for all normal control at the camera. In GPL's latest basic image orthicon chain the number of units required for station operation is three—camera, camera control unit, and camera power unit — where synchronizing generator is already available. In addition, GPL has designed an extremely compact sync generator with built-in power supply, for studio and field use.

Compactness has been stressed in the design, with the result that the chain is portable and may be set up in a few minutes in the field. With the addition of a GPL Video Switcher and a Master Monitor, the system accommodates as many as five chains and two remotes, furnishing RMA standard video outputs. The Switcher Unit provides the complete studio range of effects, in a small portable package, making it particularly adaptable to the new station where maximum field to studio interchangeability is required. Since the GPL chain can be integrated into existing installations and operated from presently installed sync generators, it meets the expansion requirements of existing studios.

I. O. Camera

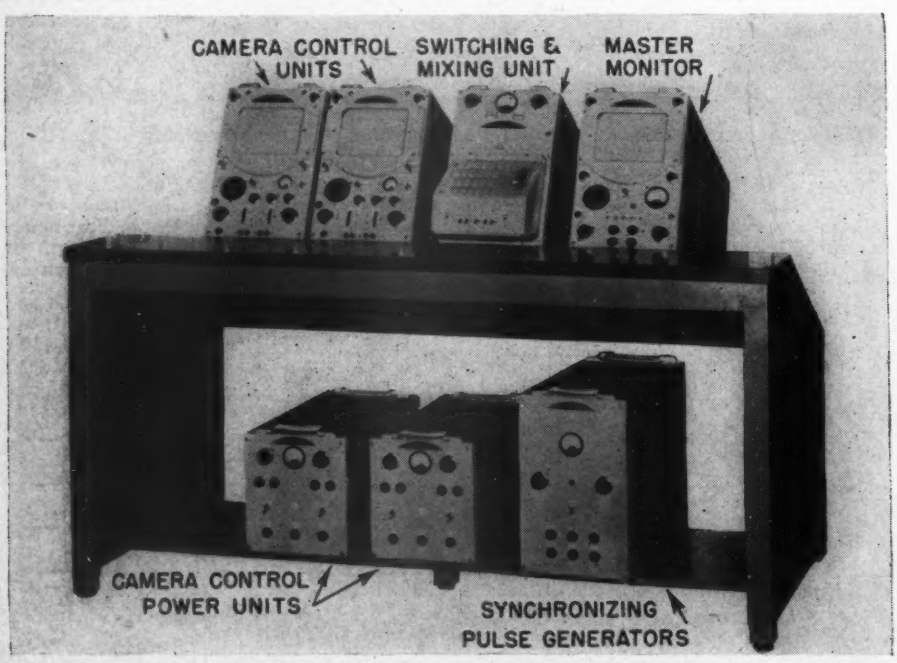
The camera, compact, portable, ruggedly built, weatherproof—has been engineered with an eye to field operation. It uses an image orthicon tube, and will work without modification on either of two systems: 1) 525 lines interlaced, 60 fields and 30 frames per second; 2) 625 lines interlaced, 50 fields and 25 frames per second. 5820 pickup tube and a 5FP4A Kinescope viewfinder tube are used. Video output is 0.5 volts peak to peak.

The camera (Fig. 3) is made up of a main frame and the following major units: image orthicon assembly and preamplifier; image orthicon supply and distribution unit; electronic viewfinder; focusing servo amplifier chassis. Mounted on the main frame are the lens turret, turret drive motor and gear box, focus servo drive motor and gear box, and iris drive motor.

The lens turret accommodates 4 lenses on an 8 in. diameter lens mounting circle. Lenses of a maximum ratio of 10:1 may be accommodated without interference. Selection of desired lens is made by means of push buttons at the rear of the camera. Focusing is controlled by rotating either of two large knobs on the sides of the viewfinder, or remotely from the remote control unit (Fig. 4). The image orthicon carriage is moved by the focus servo drive motor which is controlled by the focus servo system. Regardless of lens focal length, 310° of control knob rotation shifts focus from close-up (9 in. diagonal) to infinity. Calibrated resistors in each lens mount set the "electrical gear ratio" of the focus servo system to effect this result. A switch inside the camera, mounted over the focus drive motor allows the cameraman to use the full range of each lens by switching to "extended" range. In this position, image orthicon travel is the full 2¼ in. for all lenses. Thus the camera may be focused on a 2 in. diagonal with a 2½ in. lens, a particularly advantageous feature when small commercial products are being televised.

Behind the lens turret is a filter wheel which can accommodate four filter discs. Three filters are provided for use with the camera—one minus blue and two of neutral density. Filters may be replaced by special masks for split view shots

Fig. 1: Equipment units required in the control of two image orthicon chains. Compactness, stressed in design, makes each chain portable and enables quick field setups



Keynoted in New TV Equipment

PART ONE OF TWO PARTS

focus, extended remote control facilities, includ-
outstanding features of GPL's latest camera chain.

and other effects with short focal length lenses.

The iris aperture on each lens is controlled by two buttons just above the focusing knobs, on either side of the viewfinder. One button opens, the other closes the iris. The button is released on reaching the desired setting. Similar control is provided at the camera control unit. Iris setting is indicated directly in *f* numbers on meters at camera rear and on the CCU (Camera Control Unit) panel. Indications on the meter are controlled by a potentiometer, actuated by an accurately cut cam on each individual lens assembly. The cam obviates the necessity for specially designed lenses with identical angular iris ring rotation. Any lens, when returned to viewing position will have the same iris setting as when last used, irrespective of the setting for previous lenses.

The remote control unit fits under the CCU and is used in conjunction with it. Remote control is provided for lens selection, focus, iris, and camera pan and tilt.

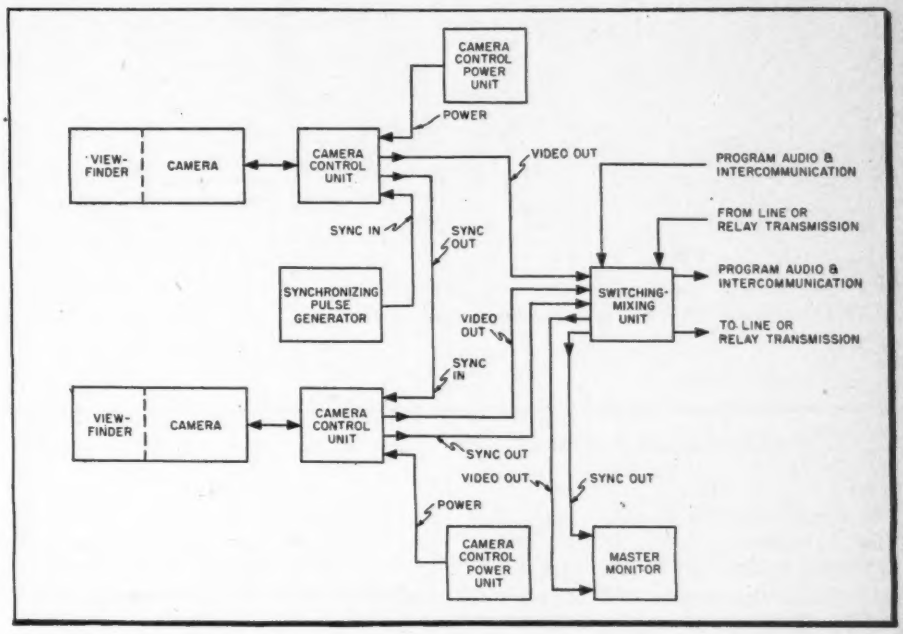


Fig. 2: Block diagram showing interconnection of the equipment elements in Fig. 1

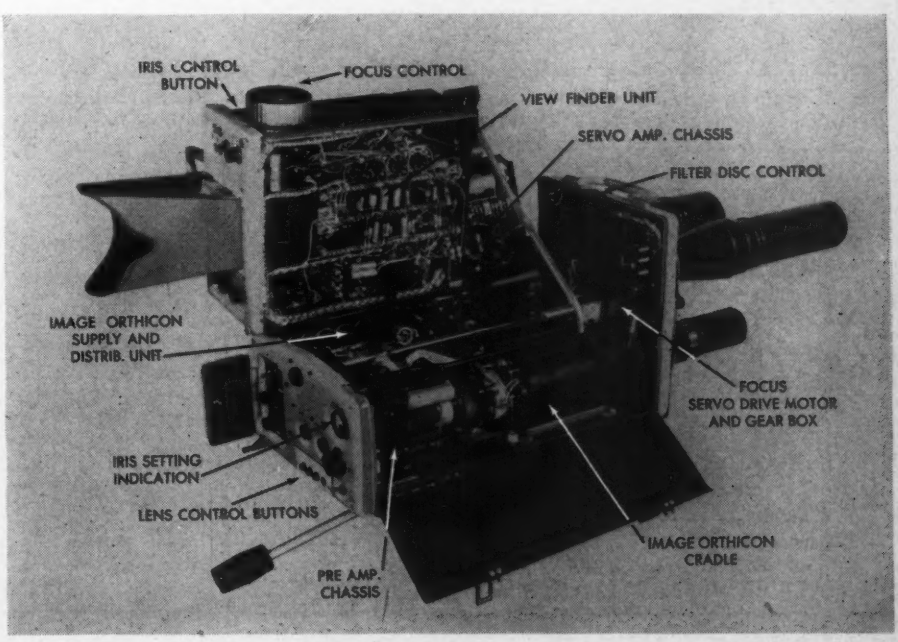
Major Camera Elements

Image Orthicon Assembly and Preamplifier: This unit consists of two distinct parts. One is the image orthicon cradle containing the tube and magnetic assembly made up of focus and alignment coil and target heater; the other is the preamplifier. The preamplifier is a four-stage video amplifier with cathode follower output.

Image Orthicon Supply and Distribution Unit: This unit generates the horizontal scan for the image orthicon, provides complete horizontal and vertical blanking, distributes vertical and horizontal driving pulses for the viewfinder, stabilizes the orthicon focus current supply, generates 1500 volts for the multiplier section and 500 volts negative for the image section of the orthicon, generates horizontal shading wave-forms, and furnishes bias protection for the image orthicon in the event of vertical or horizontal sweep failure.

Focus Current Stabilization (Fig. 5): A regulator circuit is provided to hold focus current constant within 0.1% of the desired value. Current through the orthicon focus coil is supplied via the series tube V-1 and the control resistor R-1. The voltage across R-1 is applied to V-2 and compared with the stabilized voltage across the neon regulator V-3 and thus used to control the tube V-1. The anode of V-1 is connected through the focus coil in the picture tube monitor and the viewfinder, then to plus 380 volt supply, thus stabilizing

Fig. 3: Interior view of camera showing major circuit and control elements



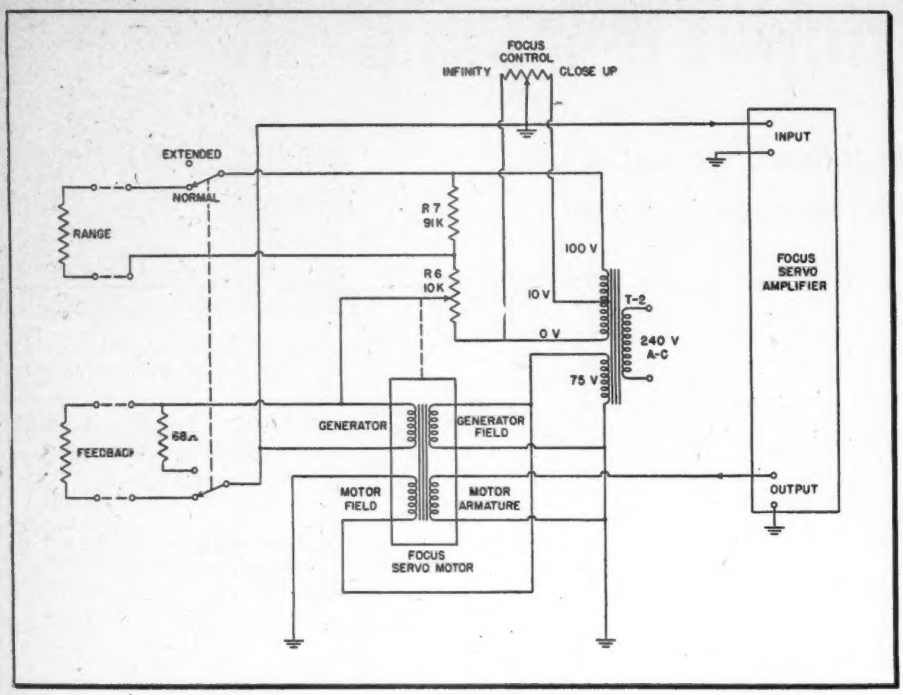


Fig. 4: Simplified diagram of focus servo circuit employing a two stage amplifier

the focus current in the viewfinder picture tube as well as the image orthicon tube. The focus current is adjustable by means of the pre-set control R-2 over a range of 60 to 90 ma.

Horizontal Scan (Fig. 6): Horizontal drive pulses from the CCU are used in the image orthicon supply and distribution unit to generate a horizontal sawtooth, which is used to drive the horizontal deflection yoke of the image orthicon through transformer T-1 (Fig. 6).

The output windings of T-1 are balanced and do not carry d-c centering current. Loading down of the high impedance deflection circuit is avoided by the use of isolating choke L-1. The stabilized focus current passes through the center tapped control R-3, which allows variable and reversible centering current to be injected into the horizontal scan coils surrounding the image orthicon tube. The two integrating networks, consisting of R-4 and R-5 in conjection with C-3 and C-4, generate opposite polarity sawtooth voltages which are applied at opposite ends of the horizontal shading potentiometer R-5 which injects horizontal shading signals into the video preamplifier. Negative pulses of T1 also combine with the sharp rise time of a signal derived from the horizontal driving pulses forming 6 to 7 microsecond target blanking pulses for the image orthicon. These pulses and similarly formed vertical blanking pulses are amplified in a twin-triode and used in a relay circuit which protects the image orthicon in case of either horizontal or vertical sweep failure. This protection is also provided in case the plug connection between the two units is faulty.

Integral Electronic Viewfinder: The flat-ended 5 in. kinescope operating at 7 kilovolts employed in the viewfinder enables the operator to see a very high resolution picture equivalent to that which is being transmitted. The use of an electronic viewfinder eliminates the possibility of incorrect focusing or aiming due to misalignment of camera and viewfinder and also provides the operator with a clear picture when working at low light levels.

The tube produces a black and white picture, magnified by a plastic lens. A tinted filter improves picture contrast for viewing under high ambient light conditions.

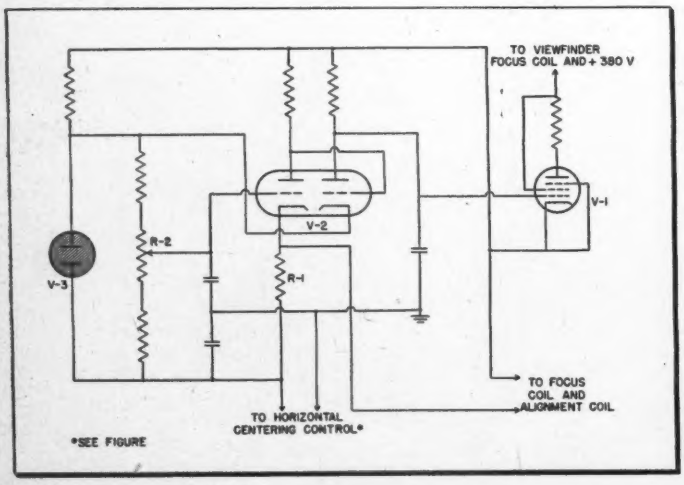
Cue lights are fitted at the front and rear of the camera and also inside the viewfinder hood, informing the operator when his camera is on or off the air, even though he may be looking into the hood continuously. The front cue lights can be switched off from the rear of the camera should it be desirable for performers to be unaware which camera is on the outgoing line.

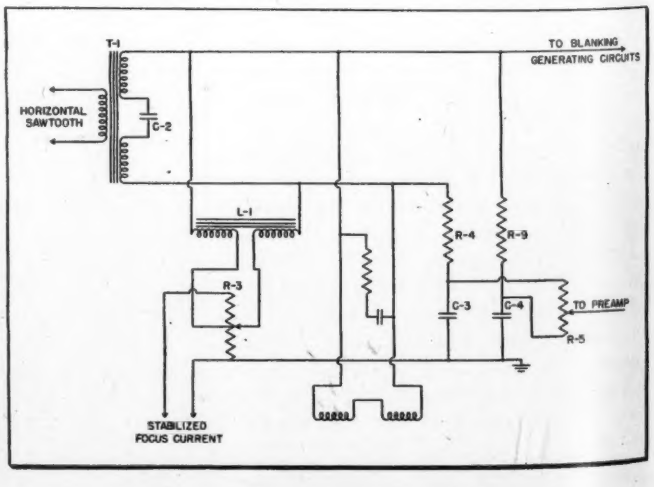
Intercom: A flexible intercom system provides for split headphones, enabling the cameraman to hear pro-

(*Continued on page* 75)

Fig. 5: (Left) Focus current stabilization circuit wherein focus current is held constant to within 0.1% of desired value

Fig. 6: Horizontal drive pulses from the CCU are used in image orthicon supply and distribution unit to generate a horizontal sawtooth, which is used to drive the horizontal deflection yoke of the image orthicon through transformer T-1.





UHF-Converter Design Features

More recent manufacturer's data provides additional details on technical characteristics of TV tuners.

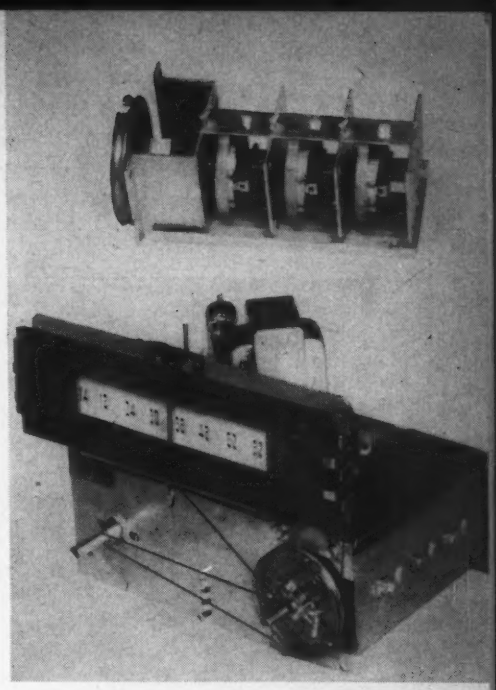


Fig. 1: (Above) Three section tuner used in P.R. Mallory's UHF-Converter (Below)

LAST month's article, entitled "TV Receiver Manufacturers Ready with UHF Conversion Devices," (p. 30) described the salient features of the new UHF tuners and converters that twelve of the nation's leading Radio-TV manufacturers are now preparing for production. Part II of the August issue also showed the UHF-TV coverage that could be expected under the presently proposed FCC frequency allocations plan. This month we are providing additional technical data on two of the units shown previously, and in subsequent issues we shall publish information on the units of other manufacturers who at this time are clearing the technical details from legal and patent standpoints.

Mallory Converter

Utilizing a recently developed type tuner, this converter, designed by P. R. Mallory & Co. Inc., Indianapolis 6, Ind., covers the r-f range of 470 to 890 MC. The tuner used in this converter is of the three section type. It consists basically of two r-f circuits overcoupled to provide a relatively constant band width, and the third section being used for the local oscillator which tunes 82 MC below the r-f band. The output of the oscillator is connected to a crystal diode as well as the incoming r-f signal. The output of the crystal goes to a low noise triode r-f amplifier which has a single broad tuned circuit in the input and a double tuned circuit in the output. The band width of the output circuit is approximately 12 MC wide so that it will cover the adjacent channels of 5 and 6. The choice of channels 5 and 6 was made because it was felt that a better noise figure could be obtained on the low TV bands, and also that the switch problem would be slightly easier. The output of the converter being at an r-f frequency of 5 and 6 enables it to be connected to any present day TV receiver.

The power supply is of the transformer type using a tube rectifier and is strictly conventional. The on-off switch serves a dual function in that it switches the VHF antenna straight through the converter to the receiver antenna terminals when in the off position. When the converter is turned on the output of the converter is connected to the VHF receiver. The UHF antenna is not switched, but is connected to the first tuned circuit at all times. A 110 volt receptacle is provided on the back of the converter so that the television receiver may be plugged in and thus turned on and off with the converter. Installation of this converter is comparable to that of installing a booster on a present day TV receiver.

Stromberg-Carlson Converter

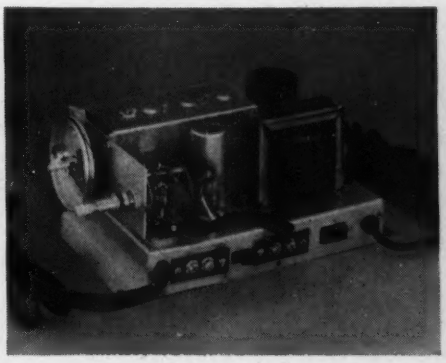
The new UHF television converter developed by Stromberg-Carlson is designed to operate on all Stromberg-Carlson receivers as well as those of other manufacturers and to tune all of the 70 channels in the UHF band. It can be installed on existing television receivers without modification in a few minutes.

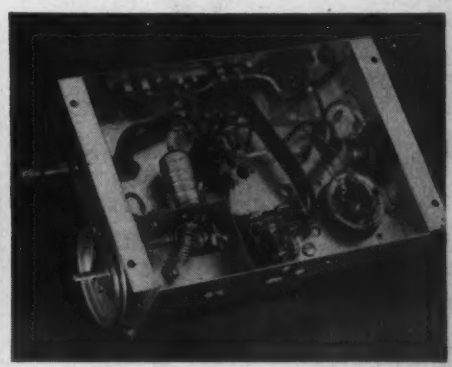
The cabinet, shown in Fig. 2, is styled in green leatherette and proportioned to harmonize with the television receiver. The outside dimensions are approximately 8 in. wide, 4 in. high and 6 in. deep. The unit weighs 5½ pounds and has a power consumption of about 10 watts. Channel indicator, vernier tuning knob and function switch are all located on the right side of the unit.

Top and bottom views of the chassis are shown in Fig. 3 and Fig. 4. The converter is designed for connection between the antenna lead-in and the television receiver. Receiver power is obtained from a socket in the rear of the converter chassis which in turn is plugged directly into the ac line. A single three-position function switch provides the following combinations: 1. Off—Both converter and television receiver; 2. VHF—a-c power to television receiver on, VHF antenna directly connected to television input. Converter heaters on. 3. UHF—a-c power to both units and choice of separate UHF antenna, VHF antenna or built-in cabinet antenna depending upon signal conditions.

The converter can be operated by

Figs. 2-4: (Left) Overall view of the Stromberg-Carlson UHF converter. (Center) Top and (Right) bottom view of chassis





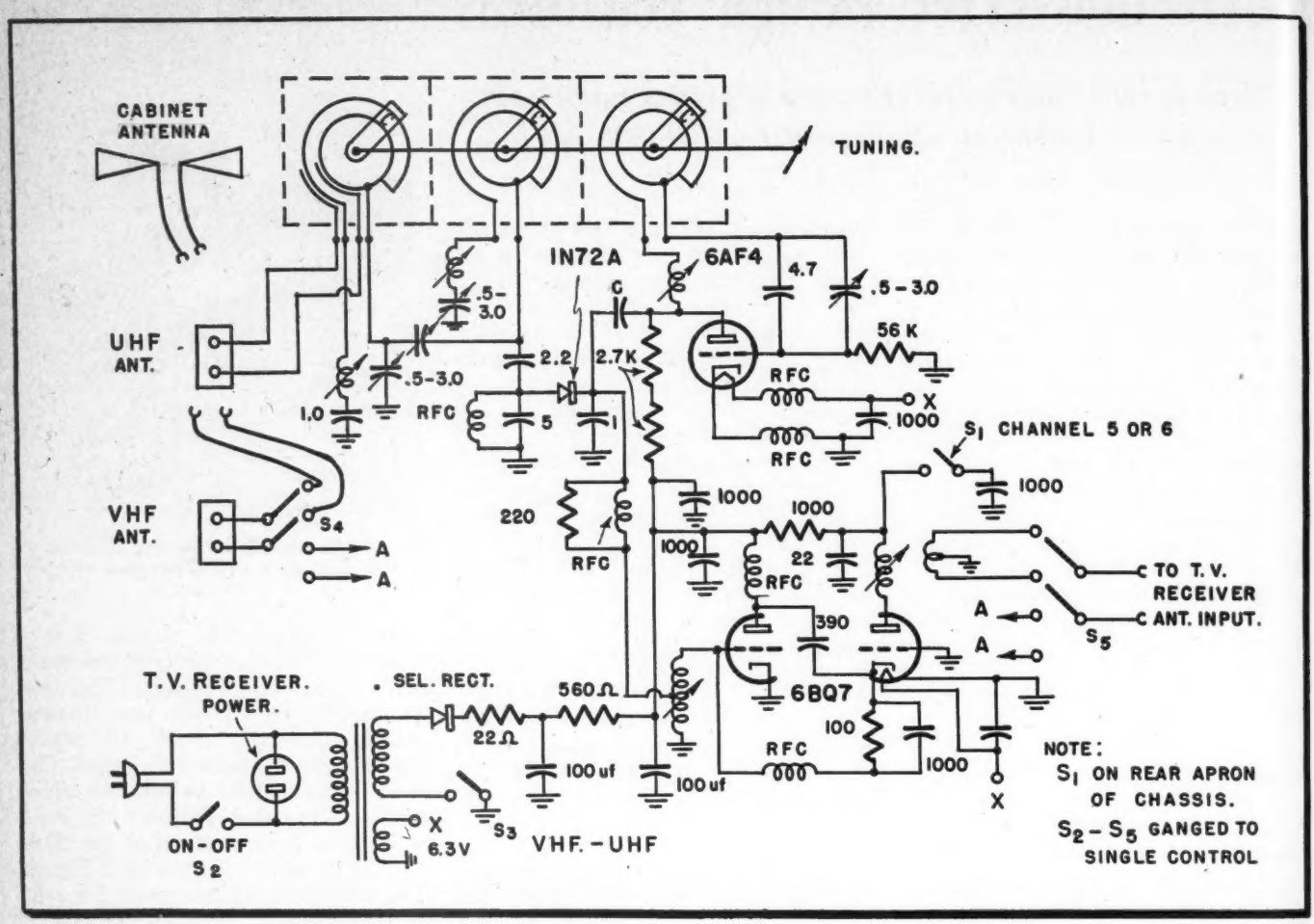


Fig. 5: Schematic diagram of the Stromberg-Carlson UHF-Converter

tuning the receiver to either of two channels (#5 or 6) which is not occupied by a local station. This choice is made during installation by a switch in the rear of the converter chassis, which shifts the first IF tuning 6 MC. The bandswitch of the UHF pre-selector circuits is 12 MC., allowing this shift without loss of tracking. Selection of this IF is a compromise providing a mean between the extremes of the high noise factor in the high channels and the undesirable spurious responses of the very low frequency channels. The rapid attenuation with increasing distance of UHF signals which might cause spurious interference appears to make it practical to use a lower IF than would otherwise be possible.

Mixer Circuits

In both the antenna and mixer circuits, the tuning elements are inductively padded in order to secure the proper tuning range. This is accomplished by extending both conductors of the antenna section and one of the conductors of the mixer section about 7/8 in. external to the tuning unit. The balanced 300-ohm antenna is coupled into the extended section of the tuning unit with the aid of an ungrounded loop.

A combination of high-side capacitive and inductive coupling is used between the antenna and mixer tuned circuits in order to provide a bandwidth of 12 MC. throughout the UHF band. The 1N72 crystal mixer is coupled capacitively to the mixer tuned circuit, and an RF choke provides a d-c return path for this circuit. (See Fig. 5)

Grounding of the low frequency ends of the antenna and mixer lines and the grounding of the rotor of the antenna section eliminate spurious suck-outs within the band.

The oscillator design utilizes a miniaturized version of the 6F4. A series trimmer condenser effectively sets the low frequency end of the tuning range, and a series trimmer inductance consisting of the grid and plate leads control the total range and the high frequency limit. This adjustment consists of varying the separation between these leads. "Holes" in the frequency range are avoided by using resistors rather than chokes in the plate and grid return circuits and by using dissimilar chokes in the cathode and ungrounded heater leads. A special UHF low-capacity tube socket is used to prevent bypassing the tuned circuit by the grid-plate socket capacity.

Tube "warm-up" drift, although somewhat a function of individual tubes, is nearly complete within one minute after application of plate voltage, with heaters previously warmed up. This initial drift is minimized by using the lowest plate power which will give reliable performance.

Complete shielding of the oscillator tube, circuit, and tuner section together with low oscillator plate voltage reduces oscillator radiation.

The conversion loss of the crystal mixer is overcome by the addition of a low noise amplifier. A "cascode" circuit using a 6BQ7 tube was selected because of its inher-

(*Continued on page* 63)

Tentative Color-TV Specifications

"Color Video Standards" Panel of NTSC Visits Demonstrations; Offers Recommendations to Guide Field Tests

THE standards for sequential color television were adopted by FCC when the commercial broadcasting of this predominantly mechanical system began some months ago. However, the majority of the television industry felt that future American audiences deserved and later would demand the superior performance offered by a compatible electronic color-TV system. All parties interested in such a system were invited to join the National Television Systems Committee under Dr. W. R. G. Baker (GE), Chairman, for the purpose of working out color standards to be submitted to FCC for adoption. This work, subdivided among nine panels, has been progressing rapidly.

Panel 13, A. V. Loughren (Hazeltine), chairman, has the responsibility for drawing standards of the complete video signal, including colormetric and electronic specifications. This group, composed of engineers from more than 20 companies active in television, had a few meetings, then embarked on a series of one-day visits to the laboratories of those who had progressed far enough in electronic color to show pictures and demonstrate the effects of changing various system constants. These visits were attended by 30 or more engineers representing 20 companies. Thus the performance resulting from various standards could be judged.

Proposed Color Test Specifications

Visits were made to: GE in Syracuse; Hazeltine in Little Neck; RCA Labs. in Princeton, and Philco in Philadelphia during the week Aug. 5-11.

At the conclusion of the round of visits Panel 13 met in New York City to discuss and record its recommendations as to standards. Formulating standards can be a dull, acrimonious long-drawn-out proceeding. But in this case, even with the natural differences of opinion between the engineering groups present, it appeared quite the opposite! Credit is due Chairman Loughren who tactfully kept the work moving and to the cooperation and willingness to compromise evidenced by those who had different ideas and methods to propose. By the end of the day all but a few of the recommendations had been reported approved. As we go to press these were next to be presented to NTSC itself. If approved, they will later be transmitted to the FCC. In the meantime, with tentative recommendations available, equipment can be built for NTSC field tests which will start as soon as possible.

These recommendations, not in their final, "polished" form, but in essence, are:

(1) The main video signal shall contain all of the luminance information for the light coming from the received picture.

2. The color sub-carrier shall be 3.89+ MC from the picture carrier. The factors are $15{,}750/2 \times 3^2 \times 5 \times 11$.

3. Oscillating Color Sequence (OSC) will be used and it will occur at field frequency. (This means that the red and blue channels will be interchanged by color phase alternating units at the field rate. This is also known as Color Phase Alternation and as "flip-flop".)

4. The color sync signal shall be in phase with the "burst" of reference carrier superimposed on the "back porch" following each horizontal sync pulse.

5. The stationary OCS axis shall be in quadrature with the phase of the color sync signal.

6. The relative amplitude and phase of the components of the color sub-carrier shall be as in the equation below:

$$E_M = E'_Y + K\left\{(E'_X - E'_Y)\cos(\omega t \pm p) + 0.5(E'_Z - E'_Y)\cos[\omega t \pm (p + 108°)]\right\}$$

Where

K is equivalent to sub-carrier amplitude, standardized at 0.75 to 1.5

p is the phase angle in degrees between OCS axis and $K(E'_X - E'_Y)$. (To be standardized later)

$\omega = 2\ \pi\ f_{sc}$

$f_{sc} = 3.89$ MC.

Gamma correction for the system is to be standardized later. For other constants see the accompanying diagram. This is used for explanatory, not equipment, purposes.

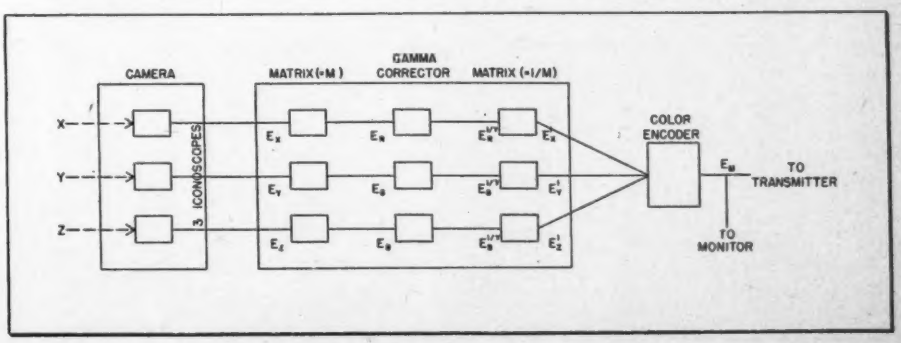
Outline of Visits

General Electric Co. showed, using a flying-spot scanner and dichroic-mirror receivers, their system set up in the laboratory. This system, in common with the others demonstrated later, consisted of a main picture carrier, modulated with the brightness information and a sub-carrier, modulated with the chromatic information. The spacing between these carriers could be varied for test purposes.

At Hazeltine, in addition to dichroic-mirror receivers, two tri-color picture tubes were shown in operation. Compatibility checks were made on three commercial monochrome receivers of well-known makes. The engineering audience commented on

(*Continued on page* 65)

Diagram illustrating derivation of equation elements in recommendation No. 6 that defines relative amplitude and phase of components of color-subcarrier



A High Quality Direct-

Developed originally for military applications, this response 20-20,000 cps ± 0.5 db, harmonic distortion

By CARLTON E. BESSEY,
Signal Corps Engineering Labs., Fort Monmouth, N. J.

THE design and construction of high quality audio frequency amplifiers have focused special attention on direct-coupled circuits. The basic reasons for employing properly designed direct-coupled circuits for this application are as follows:

1. Uniformly flat response throughout the audio frequency range.
2. Constant phase shift versus frequency characteristic.
3. Low harmonic and intermodulation distortion characteristic.
4. Simplicity of layout and low cost of construction.

Many of the direct coupled circuits which are familiar to most experimenters, were found to be unsatisfactory for the following reasons:

1. Instability with respect to variation in line voltage and operational time.
2. The requirement of critical values for components which are usually non-standard sizes.
3. The difficulty in adjusting the circuit constants for optimum static and dynamic balance.
4. The requirement of expensive high voltage, high current power supplies.
5. The need for voltage regulation to provide a usable degree of operational stability.
6. Relatively high cost of construction and the requirement of a critical layout.

These disadvantages have resulted in unfavorable comments on direct coupled circuits by the majority of experimenters. Strangely enough, very little has been done to eliminate these difficulties in the basic design of the complete, direct coupled circuit.

The circuit illustrated in Fig. 1 incorporates means for eliminating or minimizing the undesirable characteristics of some of the older direct-coupled circuits.

Special attention is invited to the manner in which tube V-1 is connected to tube V-2. It is apparent that the total output of the double triode V-1 (plate to plate) drives each grid of the double triode V-2, also a phase shift of 180° for each of the input voltages for V-2 is made firm by means of the physical connections employed. This feature performs two desirable functions: The magnitude of the grid drive for each section of V-2 is twice that obtained from conventional circuits; the grid drive voltages for each half of V-2 are exactly equal and opposite in phase throughout the audio frequency spectrum.

Grid Bias

Grid bias for each section of V-2 is obtained by resistors R_4, R_5, R_6 and R_7 which divide the plate potentials of V-1 in the right ratio for optimum operation of V-2. It is to be noted that the ratio of R_4 to R_5 must be approximately 1:100 and $R_4 + R_5$ must be at least ten times the plate impedance of V-1 in order to cause negligible degradation of the signal voltage emerging from V-1. The two cathode resistors R_1 and R_3 together with potentiometer R_2 provide means for setting proper grid bias voltage for optimum perform-

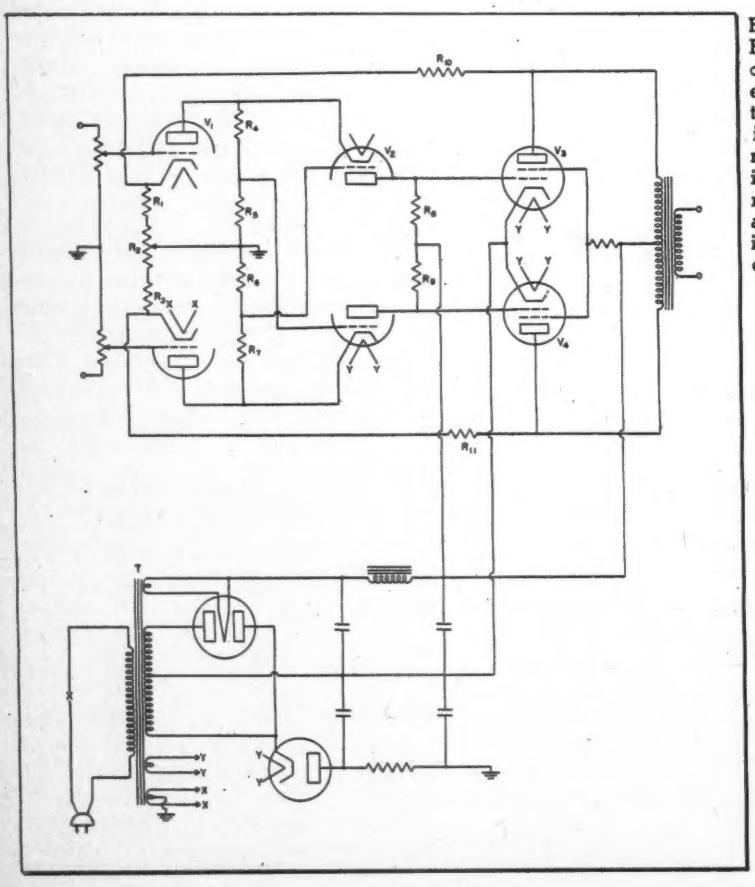
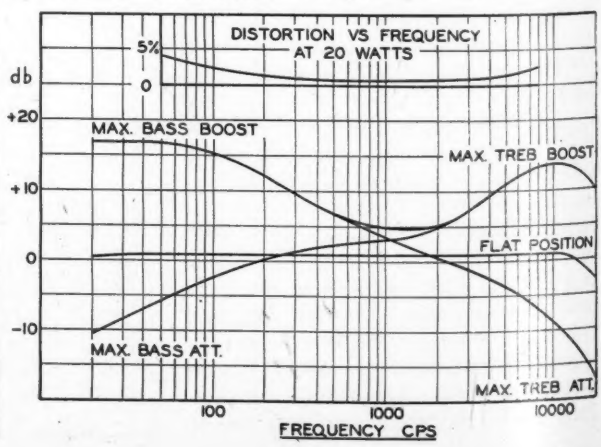


Fig. 1: (left) Basic direct-coupled circuit employed in this equipment incorporates means for eliminating or minimizing undesirable characteristics of earlier designs

Fig. 2: (below) Amplifier frequency response with tone control circuit. Distortion vs. frequency at 20 watts output



Coupled Audio Amplifier

design features an overall 72 db gain with frequency less than 2% and intermodulation distortion less than 6%

ance of both sections of V-1. When potentiometer R_2 is properly adjusted, plate currents for both sections of V-1 will be equal and the plate voltages will then be equal, or will differ by a negligible amount.

It is evident that the bias voltages for V-2, supplied by the voltage dividing network composed of R_4, R_5, R_6, and R_7, will also be equal, which in turn results in equal plate currents for each half of V-2. The plate load resistors for V-2, which are R_8 and R_9, will then have equal IR drops and, therefore, set the d-c voltages for the grids of the push-pull power stage at equal values. The value of R_8 and R_9 can be calculated to provide the proper dc grid voltage for optimum performance of any of the popular types of power tubes. If it is found that reasonably balanced double triodes cannot be obtained for positions V-2 and V-3, a potentiometer may be inserted between R_8 and R_9. The resistance value of R_8 and R_9 should be reduced by 25% and the resistance value of the potentiometer should be approximately 50% of the original value. The potentiometer then provides means for individually adjusting the bias voltage for each of the power stage tubes V-3 and V-4.

Generally, this corrective step is not required; however, it provides means for obtaining the ultimate in performance of the system with respect to minimum internal noise and minimum distortion at full power output level.

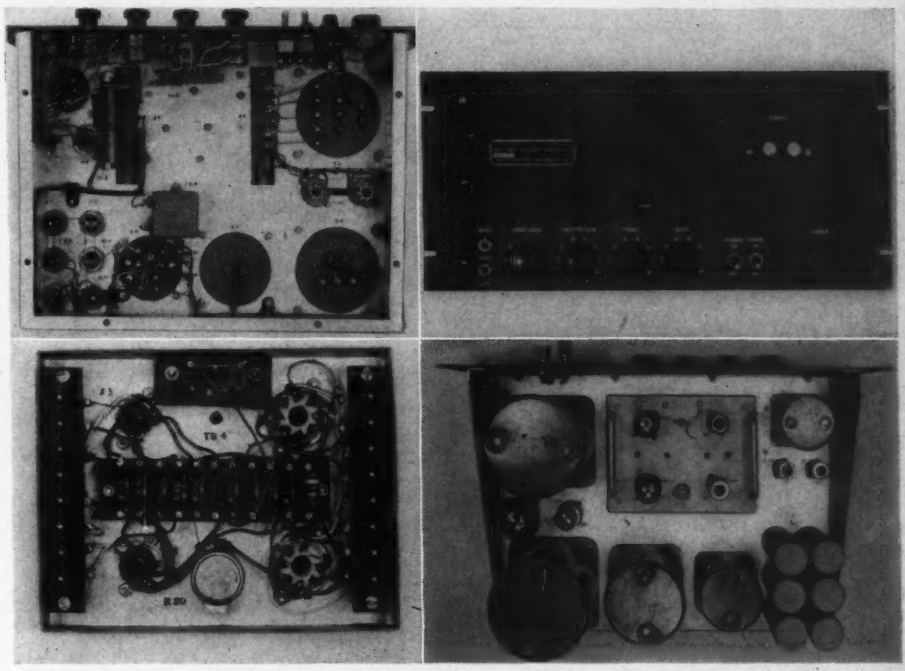
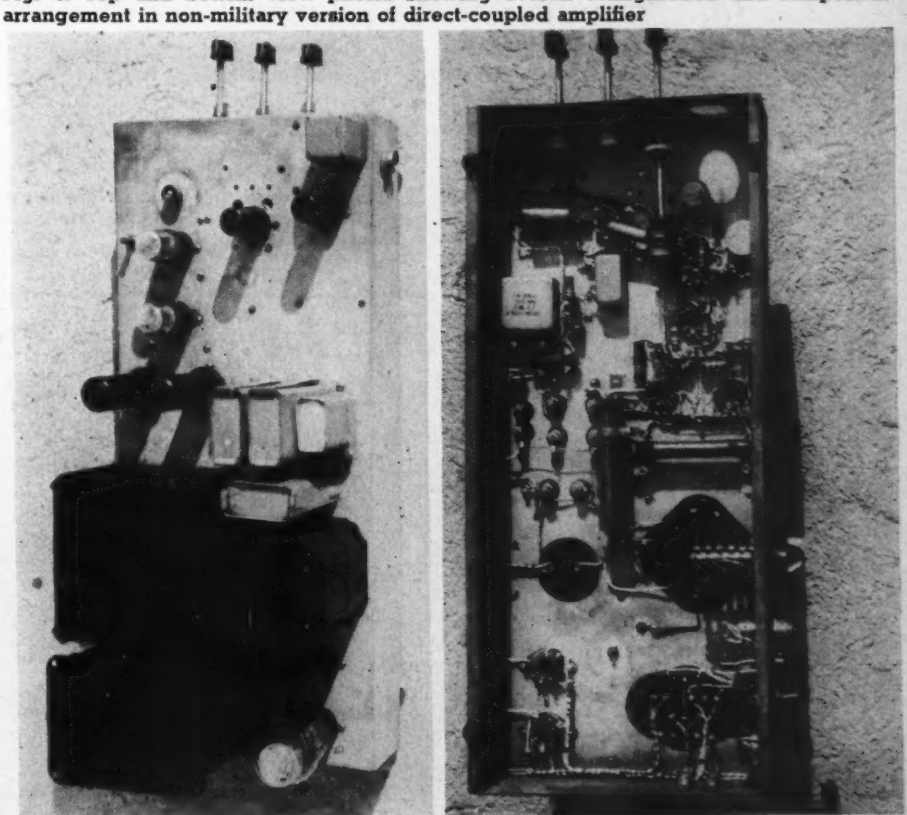


Fig. 3: Army type T-10, direct coupled audio amplifier. Bottom views, left, show components and wiring of equipment (above) and amplifier sub-chassis (below). Front view showing controls and terminations in upper right photo while lower right shows principal components including direct-coupled amplifier sub-chassis.

Fig. 4: Top and bottom view photos showing overall configuration and component arrangement in non-military version of direct-coupled amplifier



Negative Feed-Back Loops

The negative feed-back loops are connected between the plates of the power stage and the cathodes of the input stage. These loops are purely resistive (R_{10} and R_{11}) and, therefore, contribute no phase shift versus frequency difficulties. They also contribute to the stability of operation of the over-all system since dc feed-back is also achieved. The use of a high quality output transformer is mandatory.

The power supply is designed to provide adequate power for the final amplifier stage and double voltage at reduced current drain for the

AUDIO AMPLIFIER (Continued)

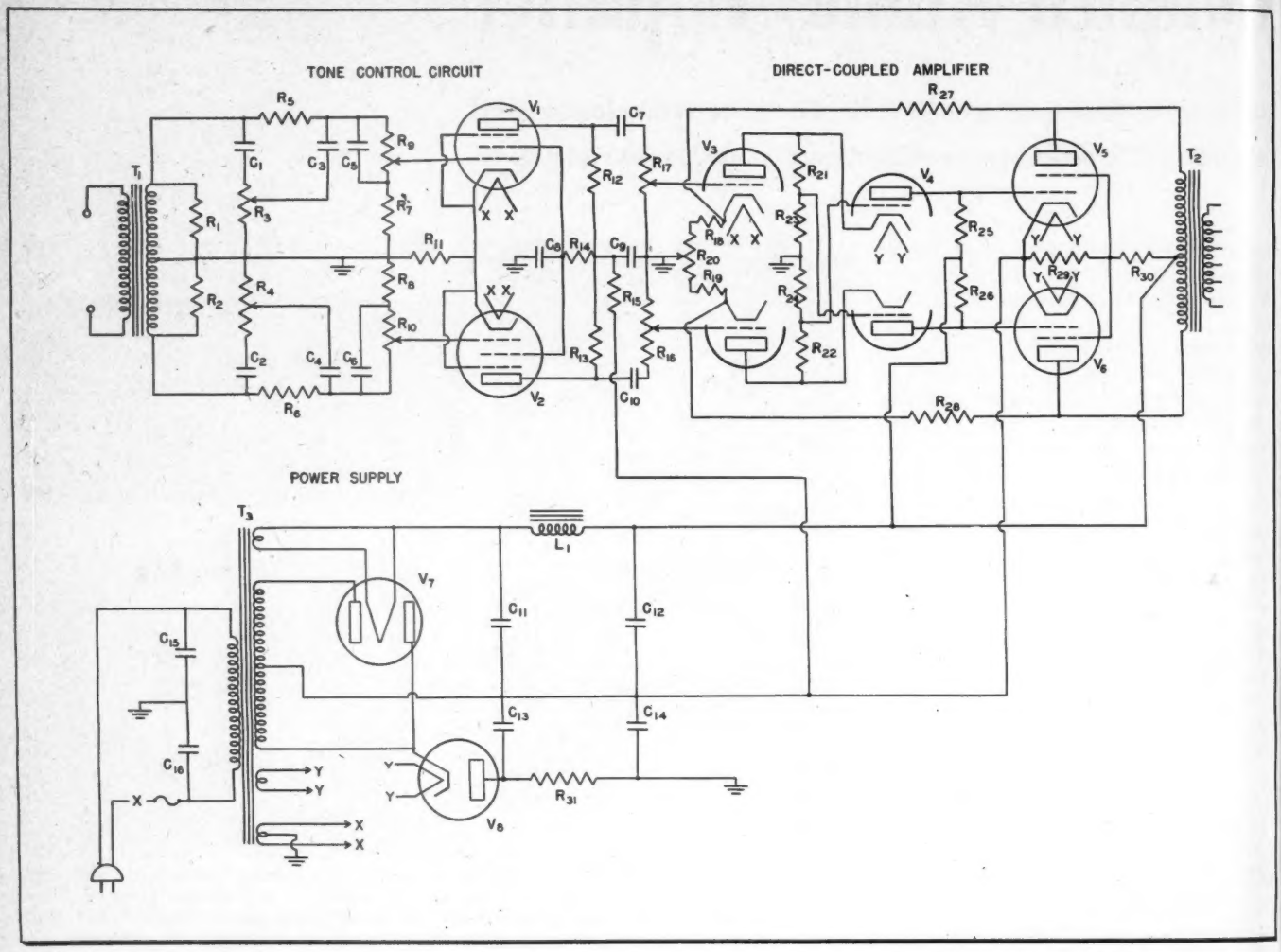


Fig. 5: Circuit diagram and list of parts used in the construction of the amplifier appearing in Fig. 4.

RESISTORS
R1 51K
R2 51K
R3) dual pot.
R4) 250K (ea.)
R5 100 K
R6 100 K
R7 20 K
R8 20 K
R9) dual pot.
R10) 500 K (ea.)
R11 390 Ω
R12 100 K
R13 100 K
R14 220 K
R15 56 K
R16) dual pot.
R17) 500 K (each)
R18 510 Ω
R19 510 Ω
R20 1000 Ω pot.
R21 5600 Ω
R22 5600 Ω
R23 470 K
R24 470 K
R25 390 K (1 watt)
R26 390 K (1 watt)
R27 690 K (1 watt)
R28 690 K (1 watt)
R29 13 K (50 watt)
R30 7 K (10 watt)
R31 10 K (5 watt)
R32 100 Ω pot.

CAPACITORS (MFD)
C1 .001
C2 .001
C3 .0033
C4 .0033
C5 .01
C6 .01
C7 .02
C8 .5
C9 2.0
C10 .02
C11 4
C12 4
C13 4
C14 2
C15 .05
C16 .05

TRANSFORMERS
T1 UTC A-11 (Input)
T2 UTC LS-6L3 (output)
T3 Power Trans 370-0-370
6.3—6.3—5.0—115
L1 10 Henry Choke (200MA)

VACUUM TUBES
V1—6SJ7 or 6J7
V2—6SJ7 or 6J7
V3—6SL7
V4—6SL7
V5—6L6
V6—6L6
V7—5R4GY
V8—6X5

proper operation of the series connected tubes V-1 and V-2. The power transformer T has two electrically independent 6.3 volt filament windings, one of which is connected to V-1, whose cathode is operating at approximately 1.25 volts above ground, and the other supplies heater current for V-2, V-3 and V-4 whose cathodes are operating at relatively high voltages above ground. The use of a single filament winding to supply all of the heater requirements would eventually result in a cathode to filament break-down in V-1.

The system described was presented to the Signal Corps Engineering Laboratories by the author for

(*Continued on page* 73)

UHF-TV Reception in Office and Residential Locations, 18 Miles from Transmitter

Editors TELE TECH:

I read with a great deal of interest your report (August issue, p. 30) concerning the UHF conversion devices demonstrated for the FCC in Bridgeport recently. I agree with you that the line-of-sight demonstration as put on in lofty hotel rooms could be compared to a controlled experiment in some respects.

But later Commissioners Hyde, Sterling, Walker and Webster and Commission technical men Cyril Braum and William Boese were driven to New Haven to see UHF transmission at distances up to 20 miles and in anything but ideal reception locations. What these gentlemen saw, I believe, reaffirmed their faith in the upper frequencies. I should like to take the opportunity of telling you about some of these receiver-converter locations. For the purposes of comparison, I should like to evaluate the transmitter monitor picture at 100% and rate pictures in the following locations on a percentage of that evaluation.

The first location is in my office in a two-story building in downtown New Haven, approximately 18 air miles from the UHF transmitter at Bridge-

(*Continued on page* 77)

New Microwave Attenuator

Developed for use in coaxial transmission lines, this inexpensive unit utilizes magnetic fields to obtain instantaneous attenuation changes

AS an outgrowth of research in power measuring techniques, Frank Reggia of the National Bureau of Standards has recently developed a new device known as a magnetic attenuator for coaxial transmission lines. The new unit is inexpensive and utilizes a magnetic field to obtain instantaneous changes in attenuation. Its operation depends on the interaction between the electromagnetic field within a transmission line, which contains microwave energy-dissipating material, and an external magnetic field applied perpendicularly to the axis of the line. As a result of this interaction, the loss characteristics of the dissipative material are substantially altered. The NBS Magnetic Attenuator requires no movable components, mechanical controls, or slotted sections in coaxial transmission line and may be operated either manually or automatically from a proximate or remote position.

Attenuators used at microwave frequencies have multiple purposes such as adjusting power levels, isolating monitoring equipment, or padding an oscillator from variations in the load. However, their use has generally been complicated by control inaccuracies and mechanical inflexibility.

In conventional microwave attenuators, the energy is usually dissipated in an element made of resistive film on glass or bakelite, powdered carbon, or polyiron materials having characteristics that vary with length, composition, and the operating frequency. The dissipative element must often be carefully machined to close tolerances and is usually very fragile. Additional difficulties arise when variable attenuation is required in a transmission line circuit. Complex mechanisms which are necessary to insure a high degree of precision and fineness of control, usually result in bulky, hard-to-handle controls at substantial increased costs.

Attenuator Design

In designing the NBS Magnetic Attenuator, efforts were made to avoid many of the disadvantages encountered in conventional attenuators. The unit is simple in construction: it is composed only of a slug of some highly permeable and resistive ferromagnetic material placed within the field of an electromagnet. The significant feature of the device is the change in the loss properties of the dissipative material when it is subjected to a magnetic field. Because the magnetic field is produced by an electromagnet, its magnitude can be changed simply and precisely by varying the current in the field coils. Consequently, the permeability and loss characteristics of the dissi-

(*Continued on page* 60)

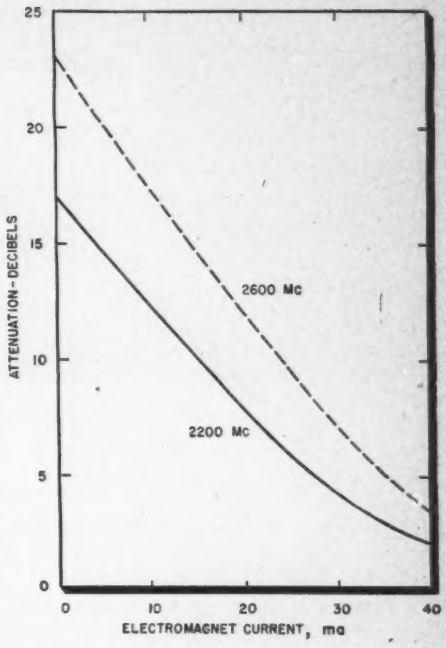
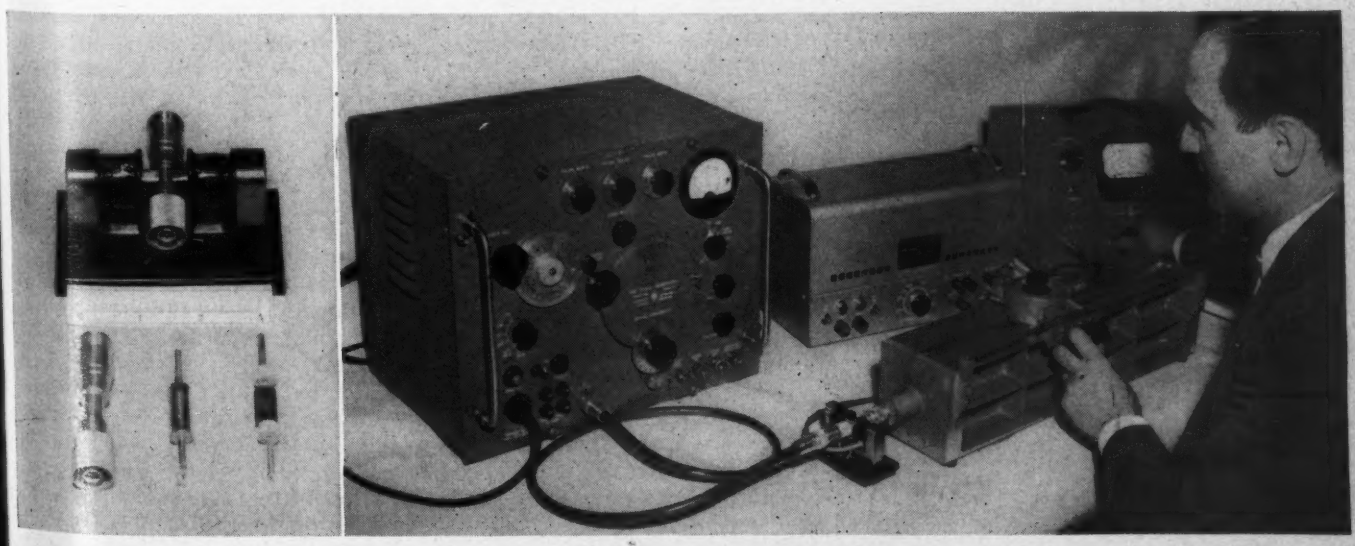


Fig. 3: Attenuation vs electromagnet current using Ferramic B as the dissipative material. Curves are for 2200 and 2600 M.C. Material is ½ in. long and ⅜ in. wide.

Fig. 1: (Left) Essential components (below) of new magnetic microwave attenuator (above). Shown (l to r) are: complete housing with type N connectors; metal sleeve enclosing elements and connector pins; magnetic slug, ceramic spacers, connector pins

Fig. 2: (Right) Device inserted into a coaxial transmission line test set-up. UHF oscillator at left supplies r-f energy, regulated power supply, rear-center, provides dc to control attenuator, latter feeds standing wave meter, center-foreground



Remote

First completely is described and

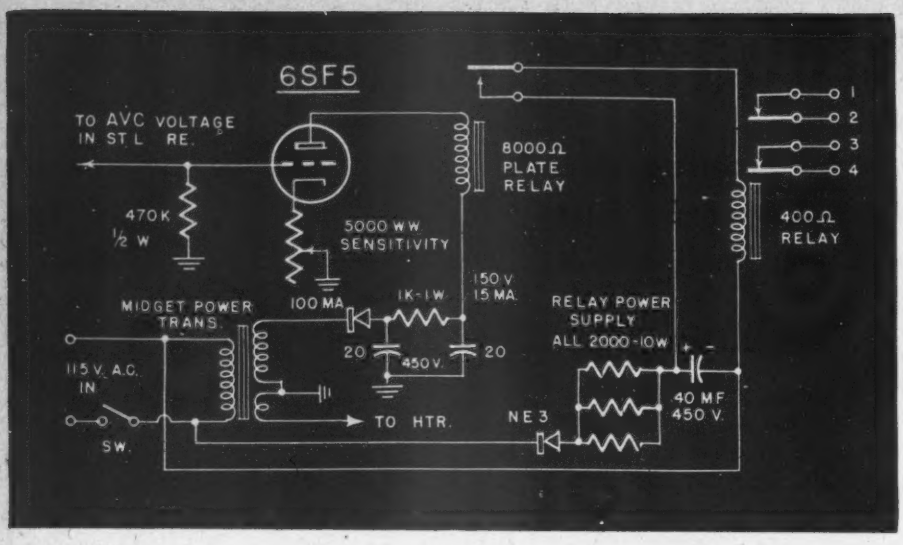
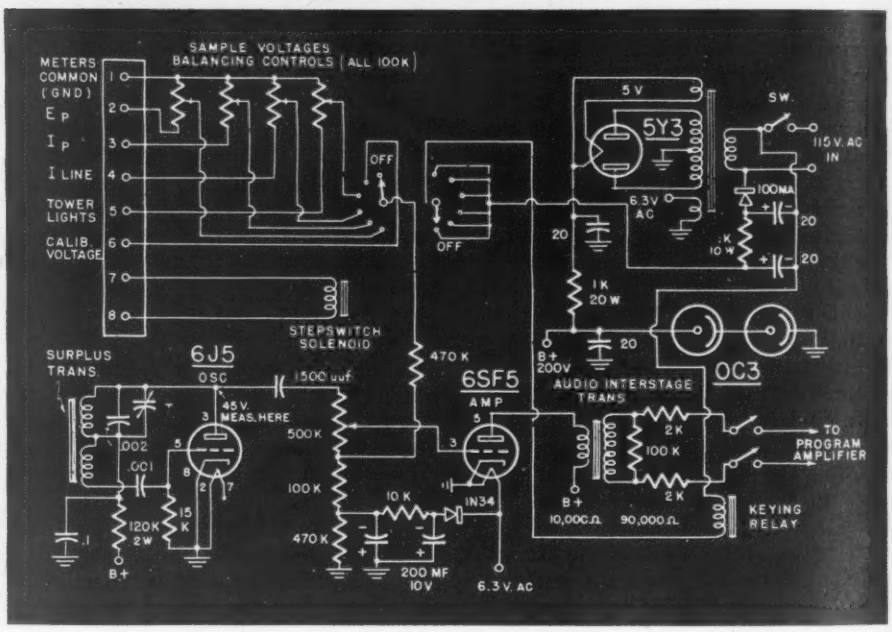


Fig. 7: Link failure protective relay circuit Terminals 1 and 2 are in series with the transmitter final plate power supply, terminals 3 and 4 are in series with the control subcarrier pickoff line so that spurious signals do not operate control relays

Fig. 8: Telemeter transmitter built from cheap components uses common tubes



By PHILIP WHITNEY,
Chief Engineer, WINC, WRFL
Winchester, Va.

BECAUSE of the intensity of the power line surges*, the main fuses would frequently open in addition to the overload relays and circuit breaker opening. All fuses have now been removed as well as the manually-operated breaker in the Federal transmitter.

For protection, a Westinghouse DB15 electrically-operated circuit breaker is employed. This breaker protects against high transients such as are caused by lightning with an instantaneous break. It also protects against permanent overloads with a delay action. The instantaneous trip occurs with a 1000% transient overload current. The slow trip can be set for any current in the range of 70 to 125 amperes. The breaker is reset electrically by a recycling device that works automatically. This recycler also resets the various plate overload relays automatically. The recycler operates three to five times within a period of a few seconds, then if the trouble persists beyond this time, the recycler automatically ceases to reset either the circuit breaker or the overload relays.

When the transmitter power is disconnected by the circuit breaker, a relay across this voltage drops out. A back contact of the relay applies 110 volts from the hot side of the breaker to the recycler. The same operation occurs when any of the several plate overload relays kick open. This 110 volts feeds filament transformers which apply filament current to a type 26 tube and a type 6J5. This voltage is also applied to the plates of these tubes through 8000 ohm plate relays. These are shunted by 8 mf filter condensers.

The heater of the 26 tube is the filament type, and heats in about three seconds with a higher than normal voltage applied to it. This tube then conducts, pulling in the plate relay, which in turn disconnects the heater supply. This allows the filament to cool. When cool, the plate relay opens, applying filament current again. This oscillation continues until the heater of the slower heating cathode type tube becomes hot enough for the tube to conduct. The self rectifying action applies current to the plate relay, operating a latch type relay, which disconnects the recycler. Thus in the event of trouble other than that caused by transient high voltage, the transmitter is de-energized, and to restore operation, the latch relay must be manually reset. About 99% of all interruptions are caused by electrical storms, and service is thus restored automatically, since these pulses are of a transient nature. To date, it has never been necessary to reset the latching relay, except while testing the equipment. A thorough weekly maintenance program is scheduled. The meter readings at the transmitter are compared with the readings at the studios in Win-

* Part one (TELE-TECH, August, 1951, pages 32-35) presented a general description of the WRFL remote system as well as a discussion of the control oscillators, band pass amplifier, and the power supply. This part continues a discussion of automatic protective circuits.

Control System for FM Stations

unattended radio broadcast station operation permitted by FCC

full circuit details and information presented in exclusive article

PART TWO
OF TWO PARTS

chester. The readings have always compared exactly.

In the event of failure of either the STL receiver or transmitter, the operator would lose control of the broadcast transmitter. To prevent this loss of control, a relay is placed in the link receiver which automatically removes the high voltage from the FM transmitter should either the STL transmitter or receiver fail. The receiver AVC is used to bias the control tube to cutoff, so that when the AVC drops or is lost, the FM carrier leaves the air. Since link failure also means no program on the FM transmitter, it also keeps link receiver noise off the air in case of failure. The Raytheon link used at WRFL has proven itself to be trouble free with the exception of normal tube burnouts.

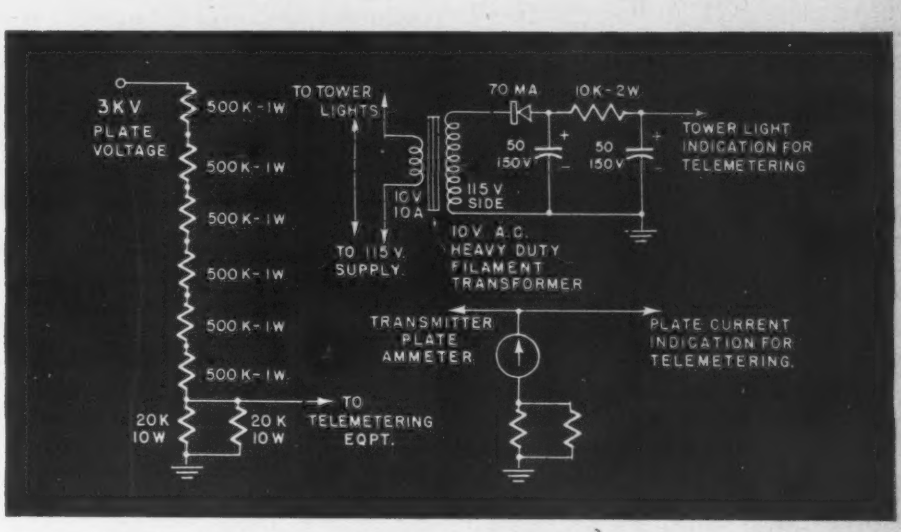


Fig. 9: Method of deriving sampling voltages for telemetering transmission remote control point. Adequate insulation is essential for high voltages points.

The Telemetering Equipment

Rather than complicate the system with a complex frequency comparison circuit, a very simple method of reading meters remotely was adopted. Fundamentally, it is merely a subcarrier modulation of the FM transmitter, the percentage of which is governed by the sampled voltage applied to it.

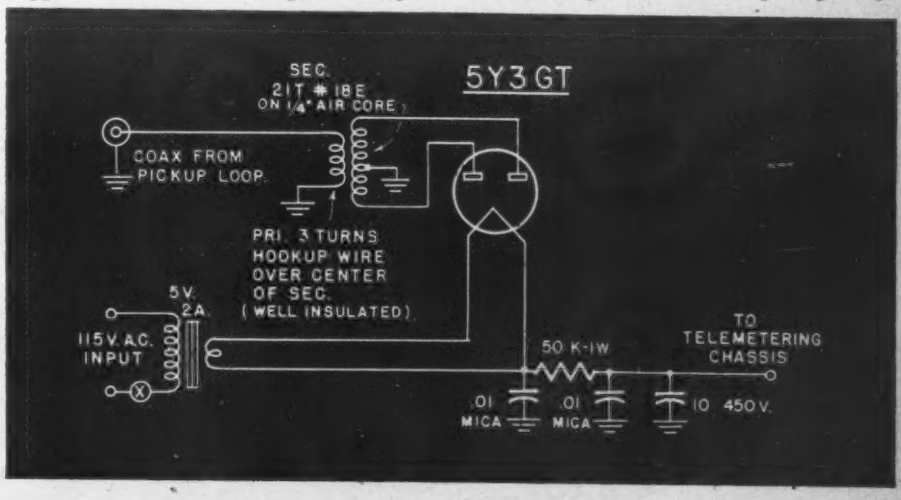
The meter reading subcarrier frequency is approximately 30 KC. This is generated by an oscillator similar to the ones used at the studio for control purposes. The output of this oscillator is fed to the grid of a hi-mu triode, the amplification of which is dependent upon the dc grid bias applied to it. The sample voltages taken from the various meters are applied to the bottom of the grid network, in effect cancelling the negative bias on the grid. This means that the value of the meter voltages (always directly related to the current, voltage, number of tower lights, etc., to be read), adjusts the percent that the subcarrier modulates the FM transmitter. The sampling voltages are selected by the rotary stepswitch. The subcarrier modulation of the FM transmitter does not exceed 5%.

It is necessary to calibrate the telemetering system every time meter readings are taken. The first stepswitch position applies the voltage from the standard, which in this case is a twelve volt battery. The gain control of the selective meter amplifier at the studios is then adjusted so that the meter hand is on the "calibrate" position. The metering pushbutton is then pressed successively until all voltages have been sampled, and read from the face of the 4 in. 500 microampere meter, which has been calibrated to show four scales, each indicating in the desired units the readings taken from the transmitter. This meter is operated by a 1N34 crystal which rectifies the subcarrier amplified by the meter amplifier.

An RC filter is used to damp the meter. Successive pressures on the "meters" button at the studios step the relay around a total of six times. First, the calibrating voltage is selected as explained, then "plate voltage", "plate current" (of the final amplifier of the FM transmitter), r-f line current, and "tower lights burning." The last position of the stepswitch is left vacant so that the subcarrier is taken off the air when the readings are finished. A stepswitch with more positions could be used if more

(*Continued on page* 80)

Fig. 10: Derivation of DC line current for metering. Simple full wave rectifier stage supplies smoothed DC signal voltage to telemetering chassis from pickup loop.



CUES for BROADCASTERS

Practical ways of improving station operation and efficiency

Edited by John H. Battison

Tape Recorder Echo Chamber

ROY L. GALLAGHER, WMCK, McKeesport, Pa.

THE public preference, as expressed in record sales, seems to learn toward recordings which are more "live"; an effect achieved by the use of controlled reverberation in "echo chambers", or other ways. Echo chambers, to be really effective, must be rather large, and the average small radio station does not ordinarily have space available for the construction of such a device. There are times when the busy engineer is called upon to produce a novelty effect for the programming department, or an "attention-getter" to help the sales department clinch a point. At WMCK, the organist, who uses a Hammond electric organ, was not satisfied with the sound produced by the reverberation devices built into the instrument.

A procedure was evolved which uses a tape recorder with three heads, allowing recording and subsequent pickup off the tape as completely separate operations. The method of producing this echo effect is simple. A bridging coil across the line to the transmitter feeds the input of the tape recorder. The output from the playback head is then fed back into the console through one of the remote positions. This gives positive control of feedback through the remote key and its associated mixer. If too much signal is fed back into the console from the tape, the system will oscillate. Experimentation will determine the critical point. The sound being fed back into the console from the tape lags the original sound by about two inches. This produces a time delay of about one-seventh of a second. The original sound recorded on the tape is added to the signal from the source, slightly delayed, and the combination then re-recorded and again fed back into the console. The number of cycles and the rate of decay is dependent on the amount of feedback introduced, and the resistance losses of the loop the signal has to travel. Examination of pulses on the scope seems to confirm the impression that the most useful effect is obtained when feedback is held to the point where four "echoes" of diminishing amplitude are heard.

$$$ FOR YOUR IDEAS

Readers are invited to contribute their own suggestions which should be short and include photographs or rough sketches. Typewritten, double-spaced text is preferred. Our usual rates will be paid for material used.

Tower Program Monitor

R. S. HOUSTON, 18 Oak Lane, Haverstown, Pa.

ON numerous occasions, there has been need to work at the tuning house, and the surrounding area, and there was no convenient way of monitoring the outgoing signal. A variation of remote antenna metering was instituted which took a small portion of the r-f signal at the coupling house to drive a speaker.

A two turn pick-up loop was loosely coupled to part of the resonant antenna tank circuit. In the case of pi couplers where there is no part which can be tapped without upsetting impedances, two turns can be made in the feed line and the link coupled to that. A 6H6 is used as an ordinary diode rectifier, and a fairly low impedance speaker output transformer is used to couple the speaker to the diode. An .001 mfd capacitor bypasses r-f. A small, six-inch projector unit was mounted on the top of the tuning house. In this way it is possible to range around the yard without being out of earshot of the speaker. Very little power is taken from the r-f source.

Duplex Operation with Presto Tape Machines

WILLIAM H. MEINERS, Chief Engineer, KRIO, McAllen, Texas

WHERE economy is a factor, broadcasting stations are purchasing one Presto PT900 tape amplifier and two mechanical units with a changeover switch box so that one can switch from #1 to #2 mechanical unit with the flip of a switch and record a full hour without a break.

However, the need arises on many occasions to record while playing back another program at the same time. In order to do this, and to make use of the high quality Presto playback amplifier, one must be able to switch the playback heads so that when recording with the changeover switch in position #1 (mechanical unit #2 playback head will be connected to the playback amplifier instead of the #1 head. Also, when the changeover switch is in position #2, the #1 playback will be connected to the playback amplifier instead of the #2 head. Another switch and amplifier can be added for monitoring the head which is carrying the program being recorded.

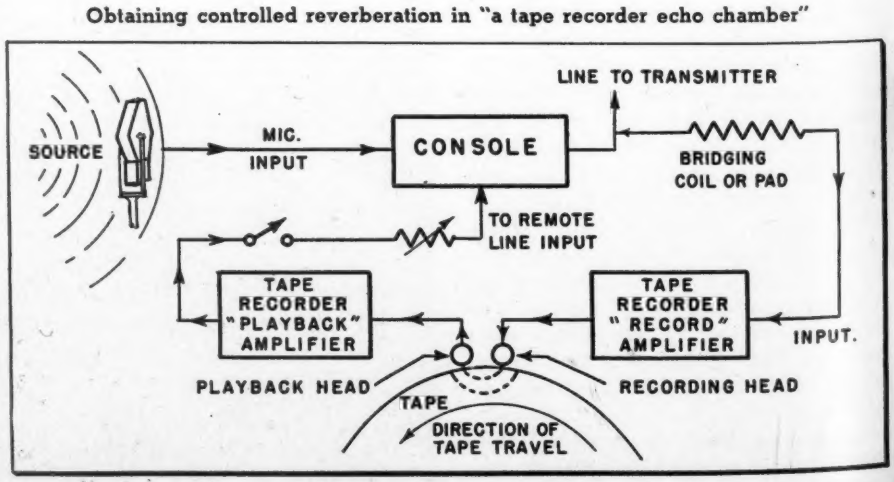
The monitor amplifier can also be used as a playback amplifier if the regular playback amplifier fails.

Automatic Arc-Over Control

G. J. CASSENS, Chief Engineer, WLDS, Jacksonville, Ill.

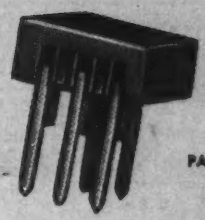
THE problem of providing protection against carrier failure is particularly important during the

Obtaining controlled reverberation in "a tape recorder echo chamber"



Cinch
SUB-MINIATURE SOCKETS

For printed circuit application contact tails solder direct to sub panel circuit. Hi Tension contacts hold tube in horizontal position.



PATENT PENDING

(Enlarged twice)

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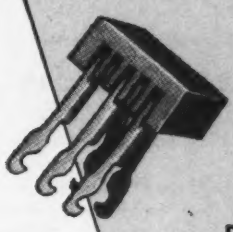
The CINCH sub-miniature socket insures positive electrical contact, holds tubes securely in place, permits easy maintenance and replacement, yields maximum insulation resistance and minimum high frequency loss, and provides manufacturers of radio receivers and hearing aids a labor saving chassis installation which serves terminal board functions while permitting designers to obtain maximum space afforded by the standard flat base tubes.

Consult CINCH



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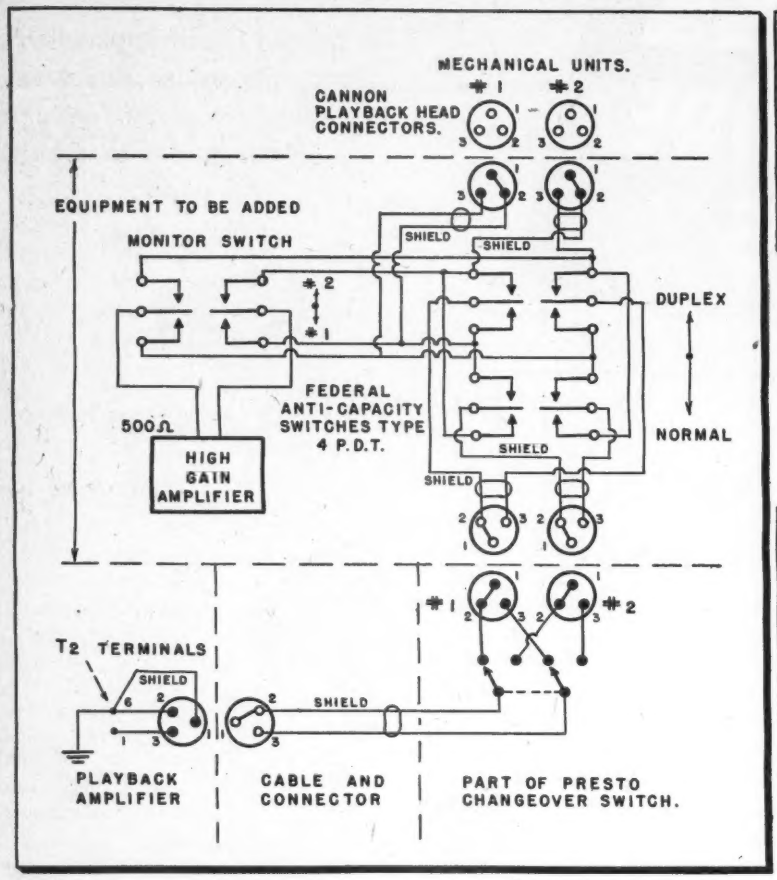
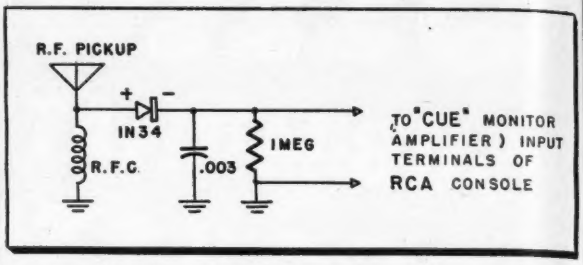
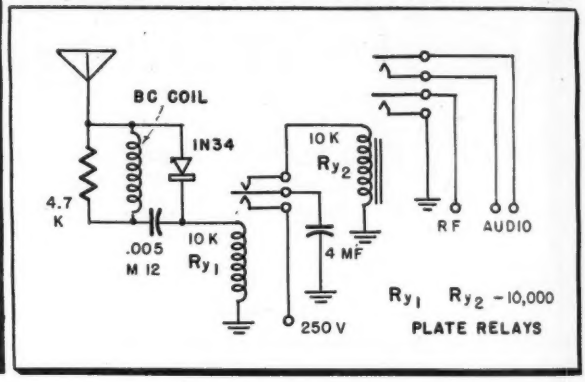




"OFF THE AIR" AUDIO MONITOR"—(above) Assembly is mounted on small terminal strip near audio block on console base. Only external lead is r-f pickup

DUPLEX OPERATION WITH DUPLEX TAPE MACHINES—(left) Changeover switch box facilitates switching from one mechanical unit to the other

AUTOMATIC ARC-OVER CONTROL—(below) Carrier drop method for carrier failure control in storms



summer months when arcs from lightning or static discharge occur frequently. A satisfactory method of carrier failure control should operate automatically and quickly so as not to be discernible on the air. When an arc occurs anywhere in the transmitter, r-f feed lines or antenna tuner, the carrier and program should be interrupted for a fraction of a second to break the arc.

Carrier Drop Method

The diagram illustrates the carrier drop method used to accomplish this at WLDS. The carrier drop circuit is composed of the BC coil, diode rectifier and relay Ry_1. The antenna required to obtain sufficient current through the relay will depend upon the power of the station. Current can be regulated by changing the length, or location, of the pickup antenna and the resistance across the coil, and should be the minimum necessary to hold the relay when the station is in operation.

Relay Ry_1 is SPDT, and when actuated by the r-f picked up by the antenna, capacitor C_2 is charged from a source of dc voltage. A monitor amplifier is used in the same rack for this purpose. Any source of voltage is satisfactory as the current is small and momentary.

In the case of carrier failure due to an arc, relay Ry_1 releases, allowing the charge from capacitor C_2 to flow through the coil of relay Ry_2 and momentarily actuating this relay. Relay Ry_2 is a DPST relay mounted in the transmitter with two contacts shorting the excitation from a low power buffer stage and the other two contacts shorting the audio input to the transmitter. The stages following the buffer stage must be biased sufficiently so as not to be damaged. Shorting the audio input prevents damage to the modulation transformer if high level modulation is used.

Control of Time Constant

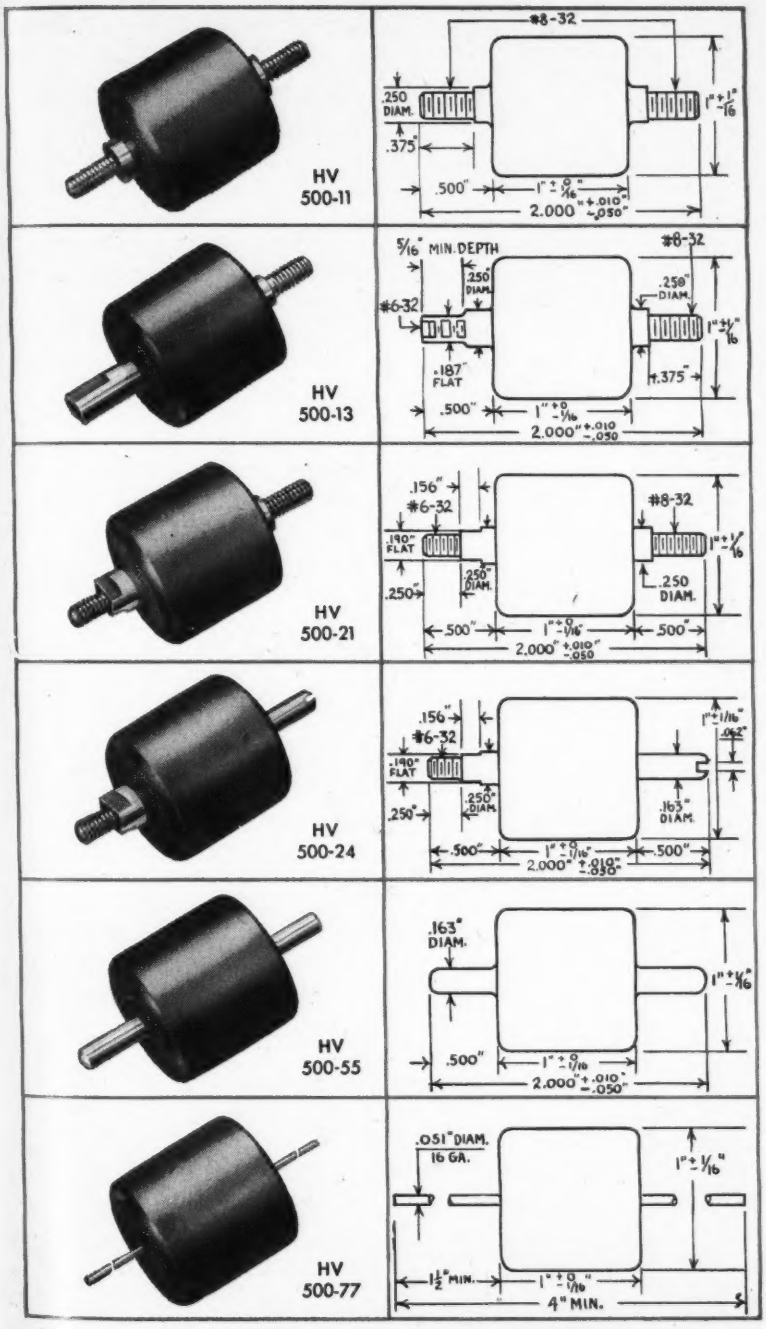
As soon as capacitor C_2 discharges through the relay coil, relay Ry_2 will release, returning the transmitter to normal operation. This will cause relay Ry_1 to actuate, again charging C_2 in readiness for another arc. The entire operation of arc-over, breaking the arc, and returning to normal operation takes only a fraction of a second and is hardly noticeable on the air. The time constant can be controlled by the size of C_2.

"Off the Air" Audio Monitor

CHARLES J. HINKLE, Chief Engineer, WFVA, Fredericksburg, Va.

A simple "off the air" audio monitor was described in the February, 1951 issue (page 40) of TELE-TECH. This is a further simplification of that idea, and shows its ease of installation in RCA-type consoles (76 series). These consoles have a number of push-buttons on the input of the monitor amplifier, for the purpose of monitoring various externally produced programs. In most installations, these inputs are either unused, or not used fully. Where such an input is available, "off the air" monitoring is easily accomplished. The circuit introduces no installation problems and a minimum of parts; the whole assembly being mounted on a small terminal strip placed where convenient near the audio block on the console base. The only external lead is the r-f pickup of very small wire, stapled under the console table. This lead is made long enough to cause approximately the same audio output from the monitor amplifier whether monitoring "off the air," or off the console output, without change of the monitor volume control.

HI-Q* HIGH VOLTAGE CAPACITORS WITH CHOICE OF TERMINALS



HI-Q High Voltage Capacitors are sturdy, thoroughly tested units capable of withstanding high voltages and operating at extreme humidity and raised temperatures.

The piercing pressure of the dielectric material is greatly increased by a meticulously exacting jacketing procedure in conjunction with a newly developed plastic with excellent arc resistant properties. Terminals are silvered brass and integrally soldered to the silver electrodes which are fired directly to the ceramic dielectric.

These HV 500 Capacitors provide an excellent working parameter when used in conjunction with high voltage horizontal output transformers.

SPECIFICATIONS

Capacity	500 mmf ± 20%
Power Factor	2% Max
Insulation Resistance	50,000 megohms
Working Voltage	20,000 V. D. C.
Flash Test	27,000 V. D. C.

NOTE: Dash numbers after HV 500 designate types of terminal. For example, HV 500-11 indicates type 1 terminal both ends; HV 500-24 indicates a type 2 and a type 4 terminal. HV 500-66 is not shown, since it is similar to HV 500-11, except that length of thread is only .250", while protrusion is lengthened to .250".

JOBBERS—ADDRESS: 740 Belleville Ave., New Bedford, Mass.

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WASHINGTON
News Letter

Latest Radio and Communications News Developments Summarized by TELE-TECH's Washington Bureau

DEFENSE NEEDS PROVE HURDLE—With FCC's announced early lifting of the television-station "freeze," the national defense mobilization needs are at present a hurdle in the course of the full development of a television "boom" to spread the coverage of the entire nation with the advantages of the video art. But outside of the retarding of the installation of new television stations after the "freeze" is lifted by the FCC, it is anticipated the "boom" will get under way steadily and satisfactorily due to the avid desires of the American public for television in the half of the nation which is not served at present.

POTENTIAL OF 2000 NEW STATIONS—Barring worsening of the war threats and resultant tightening of the restrictions on critical materials and metals, the industry visualizes that after the initial 50 new stations, the establishment of new television stations will continue at an accelerated rate after 1952 to a total of 1500 new stations in the next five or ten years. Eventually, as is well known and has been forecast by FCC Chairman Wayne Coy, the VHF and UHF channels will provide spectrum space for a potential of 2000 new TV stations throughout the United States.

TV STATIONS ON AIR WITH HIGHER POWER—During late August and early this month, between 40 and 50 of the present television stations increased the power of their present transmitters, under special temporary authorizations by the FCC to permit expanded coverage of their video service areas. In many cases the stations only had to readjust their transmitters; in other instances stations moved their antennas to new higher sites, and several stations obtained new transmitters with higher power which they had previously ordered in anticipation of the FCC action. RCA in a timely announcement after the Commission decision to grant higher power, made available to television broadcasters its 10-kilowatt VHF television transmitters which are more than twice the power of TV transmitters now in use.

TELEVISION WINS OVER MOBILE—So as to provide a full sweep of space in the ultra-high frequency range, the FCC rejected the proposal of the Bell Telephone Laboratories to establish a 30-megacycle broad band service for mobile radiotelephony in the 470-500 MC area and specifically allocated the spectrum space to five UHF television channels. The vote on the Commission's majority opinion was five to one.

NATIONWIDE TV SYSTEM—Although the FCC agreed that the Bell Laboratories' presentation of the necessity for 100 mobile radiotelephone channels in congested cities through the broad band system was meritorious, its majority opinion emphatically stated the "loss of any of this (UHF) space to other services would severely handicap the attainment of an adequate nationwide and competitive television system." The FCC majority also pointed out that the 470-500 MC space can be most valuable for stratovision and polycasting in television operations.

TECHNICAL EXPERTS TO AID—In order to assist it in seeking a solution to the contested mobile radiotelephone operations, the FCC has properly called upon the Joint Technical Advisory Committee of the Institute of Radio Engineers and the Radio-Television Manufacturers Association, headed by John V. L. Hogan, to formulate the best means of saving frequency space for the mobile services. FCC Chairman Coy asked the JTAC to survey the narrowing of the separations between frequencies in the 152-162 and 450-460 MC bands; the feasibility of different methods of modulation, including single side-band; and the consideration of single channel and multi-channel and broad band types of operation.

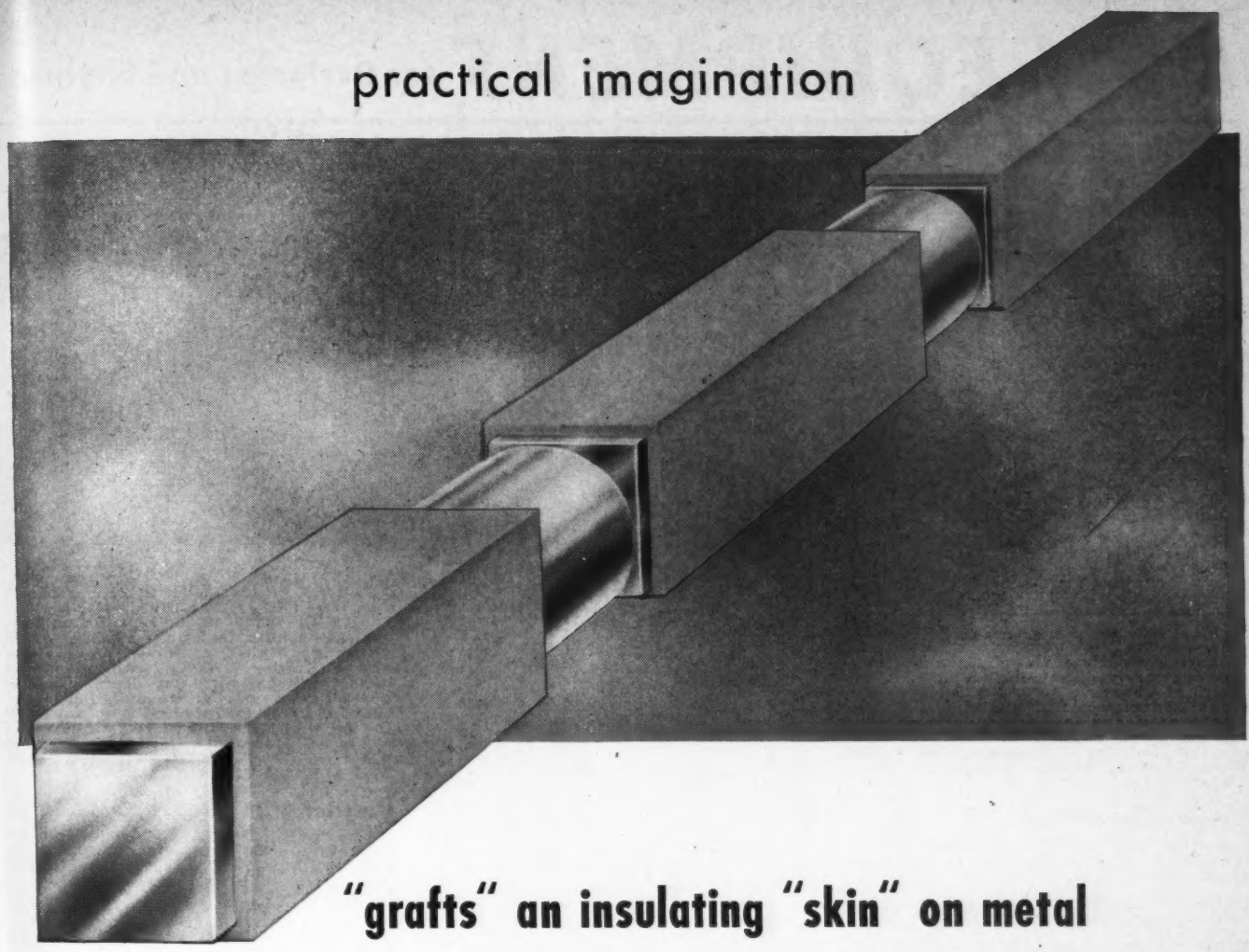
MUNITIONS BOARD EXPERT—Marvin Hobbs, who has headed the Munitions Board's Office of Electronic Programs since last August and prior to that had been its acting chief from May to August, has been designated expert advisor to board chairman John D. Small and Production-Requirements vice chairman C. W. Middleton on all phases of the Department of Defense's planning and requirements for electronics-radar-radio equipment.

ELECTRONIC PROGRAMS OFFICE—Succeeding Mr. Hobb as chief of the electronic programs office is a well-qualified Army Signal Corps officer, Col. Clifford A. Poutrie, who has first-hand knowledge of combat requirements from his command of the Yokohama Signal Depot of the Eighth Army which has carried the brunt of the fighting in Korea. The above appointments are expected to make the functioning of the Munitions Board in the planning of production schedules and of requirements for controlled materials more efficacious.

National Press Building
Washington, D. C.

ROLAND C. DAVIES
Washington Editor

practical imagination



"grafts" an insulating "skin" on metal

Here is another example of the practical imagination C-D engineers can put to work to solve your problems. In this case a heavy electrical connector had to be covered with a safe, efficient insulation. The material best suited to do the job was C-D Dilecto.

The next requirement was to make this insulation an integral part of the whole piece. Here is where practical imagination went to work. The solution was to laminate and mold the Dilecto directly on the metal bar.

When you have a problem involving plastics—whether it is simple or complex—be sure to check with C-D engineers for a practical, unbiased recommendation. They can choose the material best suited to your needs from a wide range of grades of five basic plastics to give you any combination of mechanical, electrical or chemical characteristics. A call to your nearest C-D office will bring you this kind of help any time—all the time.

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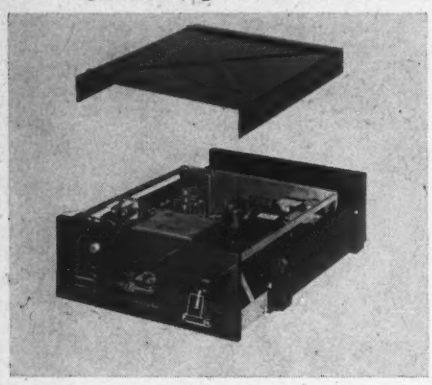
NEW EQUIPMENT for Designers and Engineers

2-Way Radio with Split-Housing Design

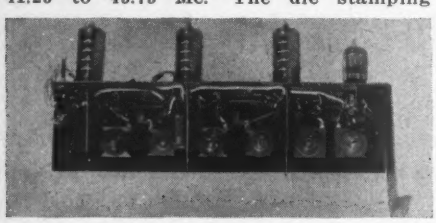
Accessibility of a 15-in. Motorola FM 2-way mobile radio housings has been increased greatly by the addition of a new "split-housing" feature. New 30



and 60-watt mobile sets are now being shipped with the new design that makes mounting possible in positions where the drawer-type housing could not be installed because chassis withdrawal would have been impossible. Because of the split-housing feature the chassis can be lifted out of the lower section of the housing.—**Motorola, Inc., 4545 West Augusta Blvd., Chicago 1, Ill.**—TELE-TECH

TV—I-F Amplifier

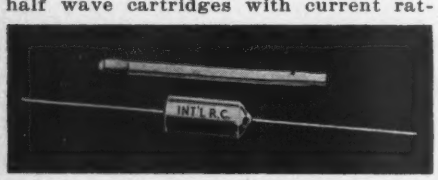
A high quality TV i-f amplifier has been designed to operate in the range of 41.25 to 45.75 Mc. The die stamping



method is employed to produce coils of absolute uniformity. The manufacturer can provide coil strips with or without coupling capacitors to customer's specifications. Any number of single or double-tuned coils in either circular or rectangular spiral configurations can be provided at specific values of inductance. Specifications and quotations are available upon request. Samples are available to responsible manufacturers.—**Franklin Airloop Corp., 43-20 34th St., Long Island City 1, N. Y.**—TELE-TECH

Sealed Selenium Cartridges

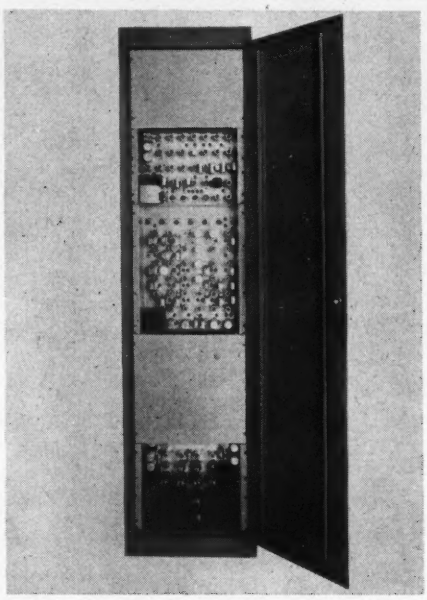
A new line of hermetically sealed selenium cartridges are assembled in half wave cartridges with current rat-



ings from 300 μamps up to 60 ma. The individual cartridges accommodate up to 400 cell elements with voltage ratings up to 8,000 v. per cartridge. By connecting a number of cartridges in series, voltages up to 250,000 v. have been obtained. The assembly is rugged and impervious to the effects of outside atmosphere. The units are capable of withstanding 100 G's of acceleration, and are ideally suited for airborne applications. They can be operated in ambient temperatures up to 100° C. The outside diameters vary from 3/16 in. up to 1¼ in., depending upon current rating.—**International Rectifier Corp., 6809 S. Victoria Ave., Los Angeles 43, Calif.**—TELE-TECH.

TV Synchronizing Generator

A new television synchronizing generator (FTL-63A) which meets all RMA and FCC specifications and recommendations for the synchronizing generator output signals has been developed. Dot-pattern signal is provided for the linearity testing of monitors and receivers. An exceedingly stable, high-speed binary frequency divider eliminates the need for expensive cathode-ray-tube monitoring. There are no operating controls or adjustments other than the master oscillator frequency. There is a choice of five lock-in sources: crystal, power-line, free, external, and interlace. Provision is also made for the addition of a



high-frequency interlace generator. Linearity dot pattern, mixed with blanking, is available on a separate jack.—**Federal Telecommunication Labs., Inc., Nutley, N. J.**—TELE-TECH

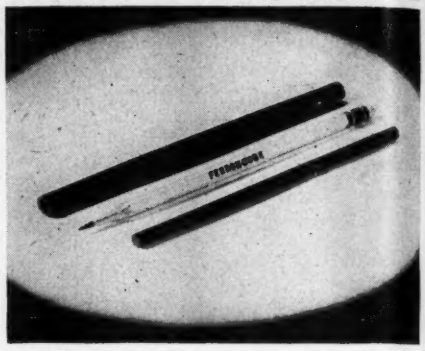
Klystron Power Supply

The 715A klystron power supply has been designed for test-bench operation of all types of low-power klystron oscil-

lators. The instrument provided a beam voltage continuously variable from 250 to 400 v. at 50 ma maximum. Reflector voltage is variable fro 10 to 900 v. at 5 μ amps. It also has provision for square wave modulation at 1 KC or may be modulated from an external source.—**Hewlett-Packard Co., 39 Page Mill Road, Palo Alto, Calif.**—TELE-TECH

Ferrite Antenna Rods

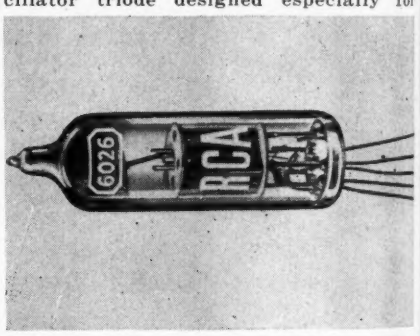
Rods of various ferroxcube materials are now being furnished to radio manufacturers and coil winding companies in



diameters from ¼ in. to 1 in. and in lengths up to 8 in. With single layer windings of insulated wire, Ferroxcube rod assemblies are used on portable radios in place of collapsible rod antennas or built-in loops. Because of the unusually high Q of these rod antennas, set sensitivity is considerably increased over the usual air loop. Because of the compactness of ferrite core antennas, they may be mounted almost anywhere in set cabinets using a minimum of space. — **Ferroxcube Corporation of America, 50 E. 41 Street, New York, N. Y.**—TELE-TECH

Oscillator Triode

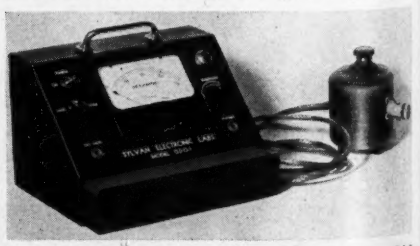
The new, flexible-lead, subminiature tube type 6026 is a high-efficiency oscillator triode designed especially for



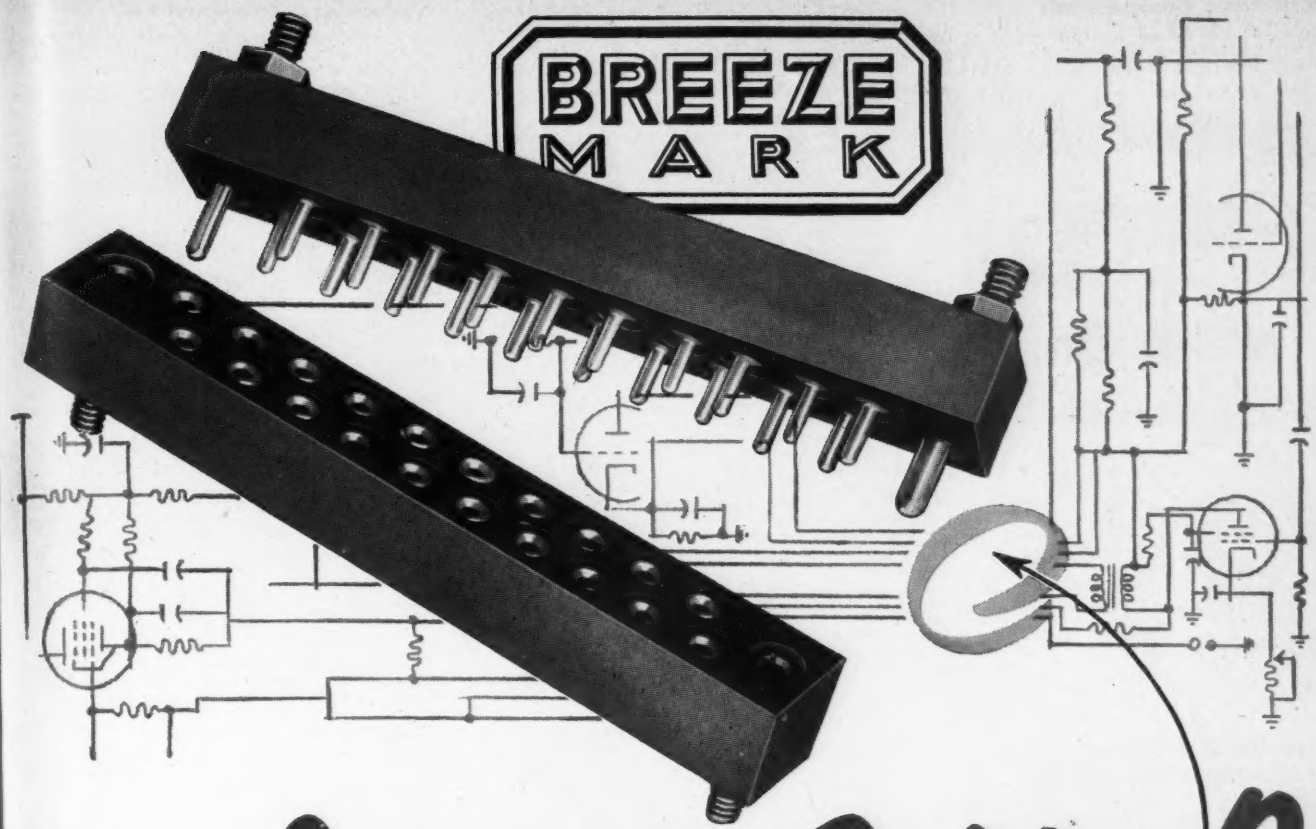
transmitting service at 400 MC in radiosonde and similar applications. In such service, it can deliver a useful power output of 1¼ watts. The subminiature structure features very short transit time and low interelectrode capacitances. Furthermore, it is small and light weight, design features which make the 6026 particularly useful in equipment requiring compactness. — **Tube Department, Radio Corporation of America, Harrison, N. J.**—TELE-TECH

Grid Dip Meter

Useful for locating parasitic circuits and spurious frequencies in transmitter and receivers, the GDO-1 grid dip meter



has a frequency range from 1.5 to 300 MC with 7 coil ranges. There is a built-in storage drawer and a large, easily-read meter with O —200 μamp movement. The unit is internally modulated and there are provisions for external modulation.—**Sylvan Electronic Laboratories, Broadalbin, N. Y.**—TELE-TECH



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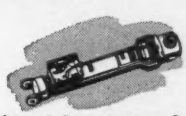
...We'll take it from HERE

Good ideas for electronic circuitry sometimes run afoul of connector problems. Maybe existing connector units won't hold air pressure gradients, won't stand the heat, aren't rugged enough for the job. Or maybe it's a question of altitude, or under-water application. But if you can sketch the circuit, we'll take it from there. We've engineered so many special connectors, solved so many "impossible" problems, that whatever the requirements are, we can usually provide the answer.



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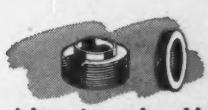

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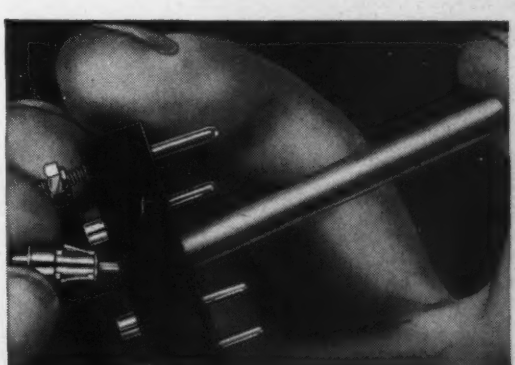
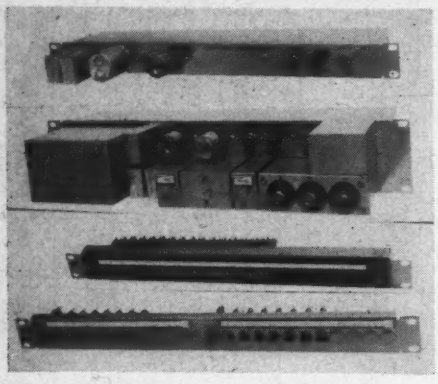


Removable pins in Breeze connectors speed soldering, save time, trouble. Pins snap back into block.

Microwave Components

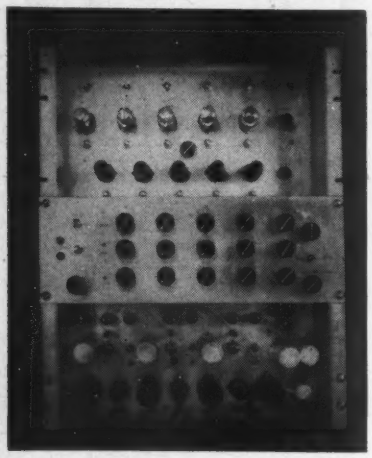
To meet the needs of microwave equipment manufacturers, apparatus for connecting microwave channel to telephone



equipment has been developed. Among these new devices are: ringdown terminating units; audio signaling oscillators; strap type attenuators; jack and lamp strips; and 4 wire to 2 wire terminating units with adjustable but not illustrated-dial terminating units, dial selective signaling and calling equipment, fault and alarm indicating and checking units. All units are designed for mounting on standard 19 in. equipment racks and feature extreme stability, long life, trouble free electronic circuit design.—**Kellogg Switchboard & Supply, Co., 6650 S. Cicero Ave., Chicago 38, Ill.**—TELE-TECH

Universal Color Bar Pattern Generator

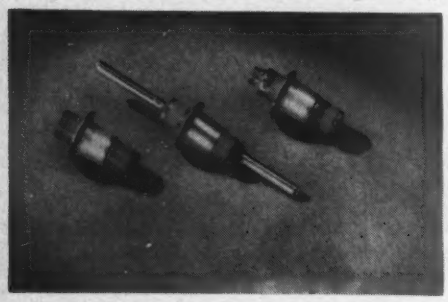
Because it generates three simultaneous color signals without noise, this new universal color bar generator can



be used for any past, present or future TV color system. Hue, brightness and saturation of the colors may be varied over a wider range than any present printing process known. Any color signal may be fed into this unit and color will be mixed with it. Levels are independently adjustable for color or monochrome. —**Telechrome, Inc., 84 Merrick Rd., Amityville, N. Y.**—TELE-TECH

Ceramic Capacitors

Two new miniature feed-through ceramic capacitors, types FT-20 and FT-25, are .135 in. maximum diameter. Type FT-20 is .400 in. maximum length and



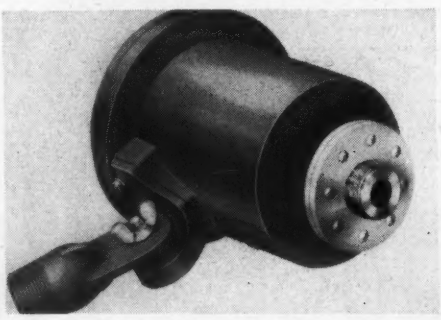
type FT-25., .690 in. maximum length. They are intended primarily for smaller, lighter weight, commercial or government equipment. Each is equipped with a ¼ in. diameter eyelet which can be soldered to the chassis. These tiny capacitors are rated at 500 volts, dc working, 1,000 volts, dc flash test. Type FT-20 is available in any standard capacitance tolerance from 25 to 250μμf.; up to 650 μμt with 20% tolerance and up to 1,000 μμf with a GMV tolerance. Type FT-25 ranges from 50 to 700 μμf. in standard capacitance tolerances; up to 1500 μμf. in 20% tolerance; GMV tolerances apply to values up to 3,000 μμf.— **Centralab Div. Globe-Union, Inc., 900 E. Keefe Avenue, Milwaukee 1, Wisc.**—TELE-TECH

Receiver

A 9-tube receiver with power output of 3 watts and an output impedance of 4 to 8 ohms has been developed and is now available in a steel, copper coated cabinet. Known as model SR-9, it has over-all sensitivity of better than .5 μv. There is a precision slide rule type dial. The entire unit weighs 3 lbs.—**Sonar Radio Corp., Brooklyn 1, N. Y.**—TELE-TECH

Explosion-Proof Driver Units

Model XP-1 and XP-2 explosion-proof driver units are used in paging, announcing, and "talk-back" systems in



locations where flammable liquids, gases and dust present an explosion hazard. Both models are blastproof and withstand 30 rounds of blast at a peak pressure of 9.5 P.S.I. Access to the driver unit is by means of a removable back cover plate. Drilled and tapped holes internally provide for the inclusion of line matching transformers up to 30 watts capacity where required. A rugged 2-piece cast serrated mounting bracket permits easy installation on walls and bulkheads and allows wide variation in angular coverage. Voice coils are wound with aluminum wire for greatest efficiency.—**Racon Electric Co., Inc., 52 E. 19th St., New York 3, N. Y.**—TELE-TECH

Scalers

Availability of a new line of counters (scalers) featuring low cost, low current drain and dependability has been announced. The scalers are constructed on small unit chasses and are equipped with phone tip jacks to facilitate rearrangement of interconnections. They are useful for counting pulses or events, programming a series of operations, or generating time markers.—**Condor Radio, 6501 W. 83rd St., Los Angeles 45, Calif.**—TELE-TECH

Plug-In Chassis

The 8862 series plug-in chassis employs ten-element connectors of a brand new design. These are the open leaf spring type which allow full accessibility. Contact springs and stationary blades are 18% nickel silver. The chassis frame assembly and base plate assembly are furnished in a knocked-down kit. Made from heavy gauged steel, the frame and base are protectively plated. The chassis plate is of heavy gauged steel with angle edge for extra rigidity. This plate is shock mounted against microphonics with four shock mounts. Complete hardware is furnished with all kits. — **Cinera Engineering Co., 1510 West Verdugo Ave., Burbank, Calif.**—TELE-TECH

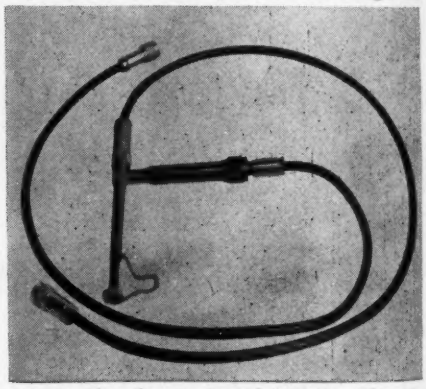
Secondary Standard Cell

A new, adjustable, all-electronic "secondary cell," operating from ac mains to provide a continuously variable dc sup-

ply over the wide range of 0.0001 v. has been developed. It is a precision unit designed primarily to work with high impedance devices; for dc amplifier testing, calibration of dc oscilloscopes and vacuum tube voltmeters, and determination of vacuum tube characteristics. Maximum output impedance of the unit is 1,000 ohms, with accuracy maintained at 0.1% of full scale. A multiple-turn potentiometer is provided having divisions of .001 of full scale. The circuit is operable with input voltages of 105-130 v., 50-60 cycles, with full accuracy.— **General Precision Laboratory, Inc., 63 Bedford Road, Pleasantville, N. Y.**— TELE-TECH

Microwave Attenuator

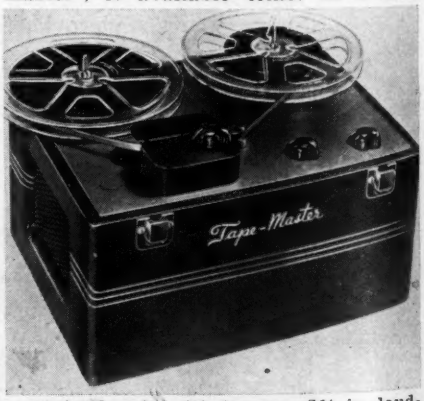
Model ST-J miscrowave attenuator operates on the principle of a wave-guide beyond cut-off and provides a range of



attenuation in excess of 140 db. The attenuator is designed to cover the frequency range from 4 to 12 KMC; it has a 50 ohm impedance.—**Polarad Electronic Corp., 100 Metropolitan Ave., Brooklyn, N. Y.**—TELE-TECH

Playback Machine

A low-cost, portable tape playback machine, which is known as the "Tapemaster", is available either as a self-



contained unit with its own 5¼ in. loudspeaker and 4 tube amplifier or with pre-amp only. Both units operate at 3¾ in. or 7½ in. per sec. to 8000 cps. with 1 and 2 hours recording time respectively, depending on speed. — **Audio Master Corp., 341 Madison Ave., New York, New York.**—TELE-TECH

Burnell NOW BIGGER THAN EVER IN THE PRODUCTION OF TOROIDS AND FILTERS

TYPICAL "Q" CHARACTERISTICS OF BURNELL TOROIDS WOUND ON MOLYBDENUM PERMALLOY CORES

Several years ago we began to specialize in the design and manufacture of toroidal coils and audio filter networks. At that time too few electronic engineers were aware of the full value of toroids (particularly those wound on molybdenum permalloy dust cores) as very little publicity had ever been devoted to a product that was fast becoming one of the most vital in the development of modern communications and control equipment.

We believe that since then through our technical service and advertising methods we have helped thousands of engineers to understand and appreciate the toroid as an essential in network applications.

The resulting popularity and industry acceptance of our toroidal coils and filters have necessitated an expansion of our production facilities to ten times what they were five years ago and we are proud to point to this growth as an expression from our customers of their satisfaction in the quality of our product and our service.

STANDARD SIZES
TC-1 = 1 5/8" O.D. x 5/8"
TC-2 = 2 1/4" O.D. x 7/8"
TC-3 = 1 1/2" O.D. x 9/16"

MINIATURE SIZES
TC-0 = 7/8" O.D. x 3/8"
TC-4 = 1-3/16" O.D. x 9/16"
TC-5 = 1-3/16" O.D. x 9/16"

MAXIMUM INDUCTANCE
TC-1 — Ind.-Up to 10 Hys.
TC-2 — Ind.-Up to 100 Hys.
TC-3 — Ind. MHY-Up to 750
TC-0 — Ind.-Up to 2 Hys.
TC-4 — Ind.-Up to 10 Hys.
TC-5 — Ind. MHY-Up to 750

EXCLUSIVE MANUFACTURERS OF COMMUNICATIONS NETWORK COMPONENTS

Burnell & Company
YONKERS 2, NEW YORK
CABLE ADDRESS "BURNELL"

TV Picture Monitor

A new high-quality TV picture monitor, which will permit a television station to monitor video signals with full

assurance that the monitor is not "cutting into" the picture signal resolution, has been developed. Designated the FTL-84A, the new monitor is especially useful in the laboratory and production testing of television video amplifiers. Resolving power has been designed for operation well beyond the specified 600 horizontal lines minimum. The picture size is 14 in. Deflection circuits have been designed for stable operation and are independent of the separately-driven pulse high-voltage supply. This permits the adjustment of horizontal linearity and size without concern for the effect on high voltage. The high-voltage supply provides 16 KV for a bright, crisp picture. — **Federal Telecommunication Laboratories, Inc., Nutley, N. J.**—TELE-TECH

High-Temperature Rectifier

Selenium rectifiers are now available, which are capable of operating without derating in ambient temperatures of 90° C. These new rectifiers are guaranteed for a minimum of 1000 hours of continuous operation. — **Sarkes Tarzian, Inc., Rectifier Division of 415 North College Avenue, Bloomington, Ind.**—TELE-TECH

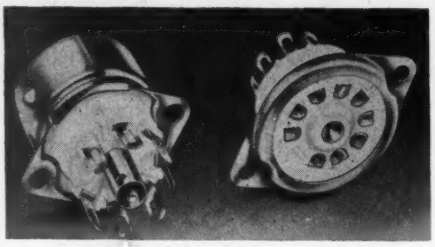
Phono Pickup

The "Fluid Sound" phono pickup consists, essentially, of an actuating arm to which the sapphire-pointed stylus is affixed; a plastic body containing three cells filled with an electrolytic, nontoxic, conducting fluid, and a rubber diaphragm. In operation, direct current flowing through the three cells in series is modulated by the motion of the stylus. The current modulations thus produced cause an output voltage to appear on the center cell electrode. This voltage is then fed in the usual manner to any audio amplifier. Needle-record contact is used only to modulate the externally supplied dc voltage as it flows through the fluid. The same basic cartridge is used for all disc-recorded sound reproduction, but three different points, universal, 1 mil, and 3 mil, are available to accommodate variations in groove-

width. Each point-size is mounted in a cartridge of distinctive color to insure quick and positive identification. Because the output voltage is derived from direct current supplied to the pickup, required tracking pressure is low and resultant stylus and record wear is minimized. "Fluid Sound" is not affected by extreme temperatures or excessive moisture or humidity; the cartridge is ruggedly constructed and will withstand more than the usual amount of rough handling, frequency response 20-10,000 cps.—**Lindberg Instrument Co., 830 Folger Avenue, Berkeley 10, California.** —TELE-TECH

Miniature Tube Sockets

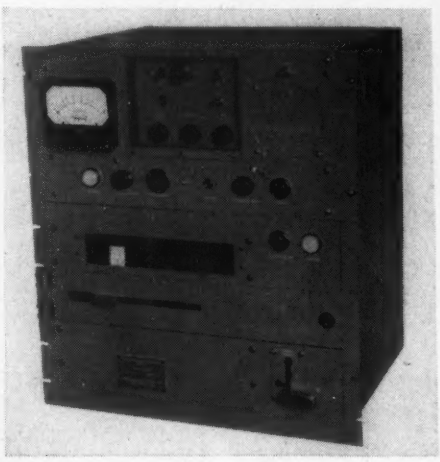
Said to be ideal wherever high or low ambient temperatures of frequency stability are problems, Chemelec miniature tube sockets are being moulded in Teflon, a tough, resilient, plastic which withstands mechanical shock and vibration and thermal shock. Teflon's loss factor is less than 0.0005 and dielectric constant only 2.0 from 60 cps to 30,000 MC and is serviceable at any temperature from 150°F. to 550°F. for long periods, with negligible change in dielectric strength, power factor and other critical electrical characteristics. Unlike other plastics, Teflon will not carbonize



in case of arcing. Also, Teflon, has a water absorption rating of 0.0% by ASTM Test; its physical and electrical properties cannot be affected by extreme humidities, corrosive atmospheres or fungus. It is nonflammable, chemically inert.—**Teflon Products Division, United States Gasket Company, P. O. Box 93, Camden, N. J.**—TELE-TECH

Recorder-Reproducer

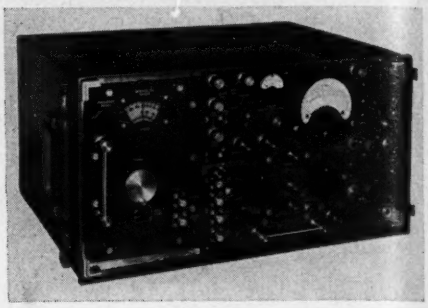
The RRP-24 is a single-channel magnetic recorder-reproducer which will continuously record or transcribe voice



frequency intelligence for an entire 24-hour day, or by utilization of its voice actuated relay control will record intermittent operations for a number of days. Separate recording and playback amplifiers permit simultaneous reproduction, or playback of earlier intelligence while the machine is operating in its recording condition. A simple, yet accurate timing arrangement indexes the entire recording. An ordinary tape recorder drives its magnetic ribbon past a recording head and stores the medium in hundreds upon hundreds of feet of tightly wound tape. The RRP-24 uses the same type of magnetic medium except that it is 8½ in. wide and 200 ft. long.—**Press Wireless Mfg. Co. Inc., Cantingue Road, Hicksville, New York.**—TELE-TECH

Noise and Field Intensity Meter

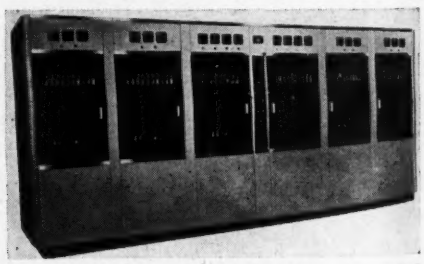
Model NF-105 is a sturdily-built noise and field intensity meter covering the 20 to 400 MC frequency range. In the de-



sign of the instrument, particular attention was paid to high accuracy and reliability of measurements, as well as to ease of operation. The frequency range is covered by means of two readily replaceable plug-in heads housing the r-f and i-f circuits. Tuning is accomplished by a single control. The unit operates on 115 v., 50 to 400 cps, or, by using an inverter, on 12 or 24 v. batteries. It is fully "A" and "B" voltage regulated for operation from 100 to 130 v. and a correspondingly wide range on battery operation. Bandwidth is 70 KC from 20 to 200 MC and 200 KC from 200 to 400 MC. The voltage range as a two-terminal r-f voltmeter is 1 to 100,000. All input circuits, termination and attenuators are so designed that the voltage standing wave ratio (VSWR) is below 1.2 to 1. The calibrating voltage is injected, by means of an injection block, at the antenna or a pick-up device used. Two calibrating standards are used: a spot frequency sinewave generator and a broadband impulse generator. The impulse generator, whose output can be made available externally, produces pulses 5 x 10^{-10} seconds wide (0.0005 microsec.). The pulse spectrum is flat to 1000 MC within ±½ db. Pulse amplitude and repetition rate are variable over a wide range.—**Empire Devices, Inc. 38-25 Bell blvd., Bayside, N. Y.**—TELE-TECH

Transmitters

Making available facilities for wider coverage and stronger fringe-area signals, new 10 KW VHF TV transmitters



are high-level modulated, air-cooled equipments. They provide a nominal peak visual power output of 10 KW, measured at the output of the sideband filter, and a nominal peak aural power output of 5 KW, in conformance with FCC and RTMA standards. Model TT-10AL is designed to operate in any channel from 2 to 6, inclusive; model TT-10AH, in any channel from 7 to 13, inclusive. Used with appropriate RCA super-turnstile-type antennas, these models are capable of providing the maximum effective radiated power proposed by the FCC. Operating costs are substantially lower per radiated kilowatt than those of commercial transmitters now in operation.

Only high-gain, air-cooled tetrodes are used in the final amplifiers of both aural and visual units. Grid modulation of these stages permits individual, non-critical meter tuning of all r-f circuits. Other design features include single-ended r- circuits which reduce the number of tubes and components required, fewer r-f stages, elimination of the need for linear amplifiers in these stages, built-in control of white saturation, high-speed ac and dc overload protection, and high-level modulation which requires only one broadband r-f circuit for tuning.—**RCA Victor Div., Radio Corporation of America, Camden, N. J.** —TELE-TECH

TV-DESIGNER'S NOISE PROBLEM

"Snow in fringe-area reception: how can I reduce it . . . economically?"

Here's a brand-new, up-to-the-minute way to cut noise nuisance at a budget figure. It's G. E.'s great new 6BK7—a miniature designed by General Electric to solve the very problem *you* face, Mr. Designer!

This new tuner tube is low in two important ways—noise level and cost. At a real bargain price the 6BK7 improves picture quality in marginal TV areas, making friends for your set right where sales are growing fastest.

Intended primarily for cascode service in v-h-f, the 6BK7 also may be used as a low-noise first-intermediate-frequency amplifier in u-h-f. Design features include: (1) a special shield between the triode sections, (2) high transconductance to improve gain and reduce noise level.

You'll take pride in the more widely usable TV set you can design around this pace-setting G-E tube. Telegraph or write for Engineering Bulletin ET-B32, just off the press! Or, if you wish, a G-E tube engineer will be glad to call on you. *Electronics Department, Section 6, General Electric Company, Schenectady 5, New York.*

6BK7

High-Gm Twin Triode

Typical operating conditions, each section

Plate supply voltage	150 v
Cathode bias resistor	56 ohms
Amplification factor	40
Plate resistance	4,700 ohms
Transconductance	8,500 micromhos
Plate current	18 ma
Noise factor, as a cascode amplifier at 216 mc	7 db

GENERAL ELECTRIC

181-K4

TELE-TECH's NEWSCAST

IRE-RTMA Radio Fall Meeting

This year the annual IRE-RTMA radio fall meeting will be held at the King Edward Hotel in Toronto, Canada, October 29-31. Tentative program, list of technical papers, and their authors is as follows:

"Noise in Television Receivers"—S. J. H. Carew, Stromberg Carlson Co. Ltd.
"Suppression of Local Oscillator Radiation in Television Receivers"—John Van Duyne, Allen B. DuMont Laboratories, Inc.
"Report of the RTMA Material Bureau"—L. M. Clement, Crosley Division, Avco Mfg. Corp.
"A New Miniature Triode for UHF TV Tuners"—K. E. Loofbourrow and C. M. Morris, Radio Corporation of America.
"Measurement of Television Gamma or Amplitude Linearity"—W. K. Squires, Sylvania Electric Products Inc.
"A UHF Television Converter"—H. R. Hesse, Allen B. DuMont Laboratories, Inc.
"Phase Linearity in TV Receivers"—Herbert Kiehne and Stanley Mazur, Emerson Radio and Phonograph Corp.
"The Chromatron—An Electronically Registered Tri-Color Cathode Ray Tube"—Robert Dressler, Chromatic Television Laboratories Inc.
"Pencil Triode for Pulsed—Oscillator and Power — Amplifier Service — John W. Busby, Radio Corporation of America.

4th Quarter CMP Allotments

Copper, steel and aluminum allotments for the 4th quarter of 1951 to communications and electronic equipment manufacturers have been announced as follows: For communications equipment—39,453 tons of steel, 53,090 pounds of copper and copper alloys, 2,900 pounds of aluminum. For electronic equipment—72,550 tons of steel, 33,385 pounds of copper and copper alloys, 15,750 pounds of aluminum.

UHF Symposium in Philadelphia

The IRE professional group on broadcast transmission systems has announced that it is sponsoring a one-day symposium on the subject of UHF to be held at the Franklin Institute in Philadelphia, Monday, Sept. 17. This session starts at 10:00 A.M. and lasts until 6:00 P.M. Admission is two dollars. Among the technical papers to be presented are:

"Impedance Frequency Measurements at UHF," R. A. Soderman and F. D. Lewis, General Radio Company, 275 Massachusetts Avenue, Cambridge, Mass.
"Progress Report on RCA-NBC UHF Project at Bridgeport, Conn.," R. F. Guy, National Broadcasting Company, New York City.
"Electronic Field Strength Analyzer for Use in TV Station Field Surveys," F. W. Smith, National Broadcasting Company, New York City.
"GE's UHF Helical Antenna," L. O. Krause, General Electric Company, Syracuse, New York.
"DuMont's 700 MC UHF Installation," W. Sayre, Jr., and E. Mehrback, Allen B. Du Mont Labs., Inc., Clifton, New Jersey.
"Fundamentals of Receiver Design," W. B. Whalley, Sylvania Physics Lab., Bayside, L. I., N. Y.
"UHF Field Intensity Meter," Boonton Radio Corporation, Boonton, N. J.
"Transmission Line Problems in Ultra-Highs," J. M. De Bell, Jr., Allen B. Du Mont Labs., Inc., Passaic, N. J.
"Some Experiments with 850 MC TV," Dr. George H. Brown, RCA Labs., Inc., Princeton, N. J.

New Microwave Links for Florida Telephone System

Peninsular Telephone Co. of Tampa, Fla., has become the first independent telephone company in the United States to adopt microwave transmission. Equipment for the new system will be manufactured and installed by Federal Telecommunication Laboratories, Inc., of Nutley, N. J. Federal has produced microwave links which are now operating on more than 12,000 channel miles of non-common carrier fixed circuits in the United States and common carrier and non-common carrier circuits abroad.

The Peninsular Telephone Co., which operates approximately 160,000 telephones in the west-central part of Florida, has ordered the building of a microwave radio relay link between its central offices in Tampa and Bartow, a distance of 40 miles.

FCC ENGINEERS ON NTSC INSPECTION TRIP

FCC Chief Engineer E. W. Allen and Broadcast Chief C. B. Plummer, together with Lab Chief E. W. Chapin and Field Research Chief W. C. Boese, were guests of NTSC and travelled the rounds of the August 6-10 color-TV demonstrations. In photo, Engineers Allen and Plummer at Syracuse, N. Y., are inspecting GE's high-power UHF-TV transmitter, guided by Manager George F. Metcalf (right). (See page 39)

Coming Events

September 10-14—Sixth National Instrument Conference and Exhibit, Sponsored by Instrument Society of America, Sam Houston Coliseum, Houston, Texas.

September 11-13—National Electronic Distributors Association, 1951 Convention and Show, Cleveland, Ohio.

October 2-4—Association of American Railroads, Communications Section, Annual Convention, Chateau Frontenac Hotel, Quebec, Canada.

October 22-24—Seventh National Electronics Conference, Edgewater Beach Hotel, Chicago, Ill.

October 29-31—1951 Radio Fall Meeting, RMA of Canada, RTMA Engineering Dept., and the IRE, King Edward Hotel, Toronto, Canada.

November 1-3—The Audio Fair, Sponsored by the Audio Engineering Society, Hotel New Yorker, New York City.

November 29-December 1—Joint Engineering Tube Equipment Council, First General Conference, Seaview Country Club, Absecon, N. J.

Glass Code	Type	Principal Use	Viscosity Data				Thermal Expansion Coeff.—/° C	Density (Sp. Gr.)	Refractive Index Sod. D Line (.5893 Microns)	Log 10 of Volume Resistivity		Dielectric Properties at 1 Mc and 20° C		
			Strain Point °C	Annealing Point °C	Softening Point °C	Working Point °C				250°C	350°C	Power Factor	Dielectric Const.	Loss Factor
0010	Potash Soda Lead	Lamp Tubing	397	428	626	970	91x10–7	2.85	1.539	8.9	7.0	.16%	6.6	1.1%
0080	Soda Lime	Lamp Bulbs	478	510	696	1000	92x10–7	2.47	1.512	6.4	5.1	.9	7.2	6.5
0120	Potash Soda Lead	Lamp Tubing	400	433	630	975	89x10–7	3.05	1.560	10.1	8.0	.16	6.6	1.1
0280	Hard Lime	General	515	547	726	—	82x10–7	2.50	1.517	—	—	—	—	—
1710	Hard Lime	Cooking Utensils	672	712	915	1200	42x10–7	2.53	1.534	11.4	9.4	.37	6.3	2.3
1990	Potash Lead	Iron Sealing	334	359	496	—	127x10–7	3.47	—		7.7	.04	8.3	.33
3320	Borosilicate	Tungsten Sealing	497	535	780	—	40				7.1	.32	5.0	1.6
6750	Opal	Lighting Ware	445	475							—	—	—	—
6810	Opal	Lighting Ware									—	—	—	—
7040	Borosilicate	Kov									8	.18	4.8	.86
7050	Borosilicate	Seri										.33	4.9	1.6
7052	Borosilicate	Kov										.26	5.1	1.3
7070	Borosilicate	Low										.06	4.0	.24
7251	Borosilicate	Elect										—	—	—
7720	Borosilicate	Elect										.27	4.7	1.3
7740	Borosilicate	Gener										6	4.6	2.1
7750	Borosilicate	Series Seal									7	.20	4.6	.92
7760	Borosilicate	Electrical								9.4	7.7	.18	4.5	.79
7900	96% Silica	High Temp					8x10–7	2.18	1.458	9.7	8.1	.05	3.8	.19
7900	96% Silica (Multiform)	High Temp		910	1500	—	8x10–7	2.18	1.458	9.7	8.1	.05	3.8	.19
7910	96% Silica	Ultraviolet Transmission	820	910	1500	—	8x10–7	2.18	1.458	11.2	9.2	.024	3.8	.091
7911	96% Silica	Ultraviolet Transmission	820	910	1500	—	8x10–7	2.18	1.458	11.7	9.6	.019	3.8	.072
8830	Borosilicate	X-Ray	475	510	715	—	48x10–7	2.25	—	7.8	6.3	—	—	—
8871	Lead Potash	Electrical Capacitors	357	384	527	—	103x10–7	3.84	—	11.1	8.8	.05	8.4	.42
8160	Lead Potash	Dumet Sealing	399	433	627	—	91x10–7	2.98	1.553	10.6	8.4	.09	7.1	.64
9010	Lead Free	Television	411	442	650	—	88x10–7	2.59	1.506	8.9	7.0	.22	6.5	1.43
9700	———	Ultraviolet Transmission	517	558	804	1195	37x10–7	2.26	1.478	8.0	6.5	—	—	—
9741	———	Ultraviolet Transmission	407	442	705	—	39x10–7	2.16	—	9.4	7.6	—	—	—

HAVE YOU OVERLOOKED SOME OF THE PROPERTIES OF GLASS?

Glass has proved an important material for electronic equipment—in tube envelopes, special tubing, sealing beads, insulation and a host of other uses. In almost every application the special electrical and physical characteristics are vital to top notch performance—characteristics such as well controlled dielectric strength, proper loss and power factor, desired transparency and corrosion resistance.

Take a fresh look at your present and projected equipment. Glass may help improve performance or lower costs. Then bring your idea to Corning and let our engineers help choose a glass for you. We have hundreds of glasses with widely varying characteristics, the research and pilot plant facilities to develop your idea and a broad variety of production facilities to produce it. For a quick look at some properties of glasses by Corning write for Bulletin B-83 to Dept. T-9, Corning Glass Works, Corning, New York.

PYREX

CORNING GLASS WORKS, CORNING, N. Y.

Corning means research in Glass

ELECTRONIC SALES DEPARTMENT — ELECTRICAL PRODUCTS DIVISION

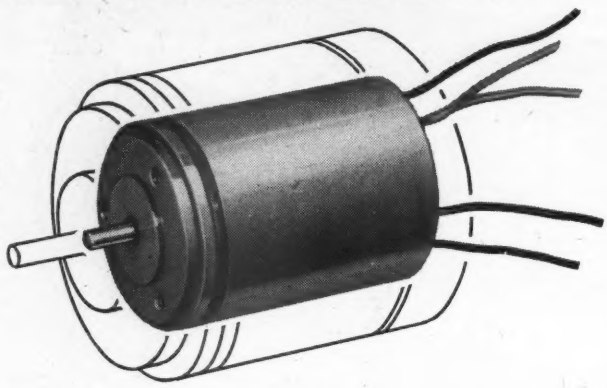
1851 · 100 YEARS OF MAKING GLASS BETTER AND MORE USEFUL · 1951

ECLIPSE-PIONEER

Announces the New Line of

PYGMY SYNCHROS

Size of pygmy as compared to AY-200 series outline



Eclipse-Pioneer has added a tiny new member to its great family of famous Autosyn* synchros. It's the new AY-500 series, a precision-built pygmy weighing only 1¾ oz. while scaling only 1.278" long and .937" in diameter (the same diameter, incidentally, as a twenty-five cent piece). Its accuracy and dependability are assured, thanks to Eclipse-Pioneer's 17 years of experience and leadership in the development of high precision synchros for aircraft, marine and industrial applications. For more detailed information on the AY-500 and other E-P Autosyns, such as the remarkably accurate AY-200 series (guaranteed accuracy to within 15 minutes on all production units), please write direct to Eclipse-Pioneer, Teterboro, N. J.

*REG. TRADE MARK BENDIX AVIATION CORPORATION

LOOK FOR THE PIONEER MARK OF QUALITY
REG. U.S. PAT. OFF.

Typical Performance Characteristics

	One AY-201-3 Driving		One AY-500-3 Driving
	One AY-500-3 Control Transformer	Two AY-500-3 Control Transformers	One AY-500-3 Control Transformer
INPUT			
Voltage	26-volts, single-phase	26-volts, single-phase	26-volts, single-phase
Frequency	400 cycles	400 cycles	400 cycles
Current	88 milliamperes	110 milliamperes	55 milliamperes
Power	0.8 watts	1.2 watts	0.9 watts
Impedance	105+j280 ohms	100+j220 ohms	290+j370 ohms
OUTPUT			
Voltage Max. (rotor output)	17.9 volts	16.2 volts	14.1 volts
Voltage at null	40 millivolts	40 millivolts	40 millivolts
Sensitivity	310 millivolts/degree	280 millivolts/degree	245 millivolts/degree
Voltage phase shift	23 degrees	26 degrees	44 degrees
System accuracy (max. possible spread)	0.6 degrees	0.6 degrees	0.75 degrees

Other E-P precision components for servo mechanism and computing equipment:

Servo motors and systems • rate generators • gyros • stabilization equipment • turbine power supplies • remote indicating-transmitting systems and special purpose electron tubes.

For detailed information, write to Dept. B

ECLIPSE-PIONEER DIVISION of

TETERBORO, NEW JERSEY

Bendix AVIATION CORPORATION

Export Sales: Bendix International Division, 72 Fifth Avenue, New York 11, N. Y.

Microwave Attenuator

(*Continued from page* 43)

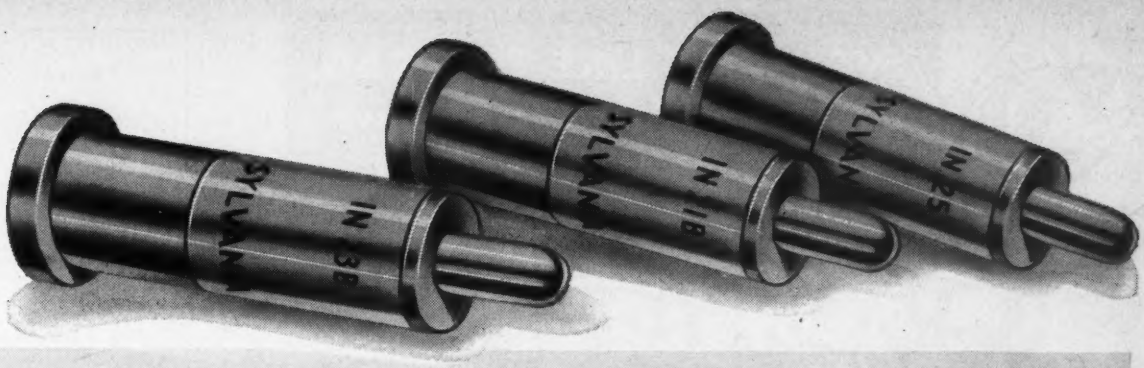
pative material are controlled, and a variable attenutor results. In addition, the control characteristics are linear over a substantial range. An NBS investigation of materials such as polyiron and ferrites (with electrical resistivities from 10^2 to 10^7 ohms/cm) indicated that the loss characteristics not only depend upon the composition and length of the material but increase with increasing frequency.

The size of an NBS Magnetic Attenuator for ⅜-in. coaxial transmission lines is only 4 x 4 x 2 inches. The dissipative material, a cylinder of polyiron, is about ½ inch long and ⅜ inch in diameter. A recessed conductor hole for the center conductor is drilled into the cylinder, ceramic insulators are placed at the extremities, the whole assembly is encased in a metal sheath, and connector pins are fastened to the ends of the center conductor. Standard male and female type N coaxial connectors complete the assembly.

The electromagnet requires a d-c power source of 0 to 250 volts with a maximum of 30 milliamperes current to produce a magnetic field of 1500 gauss in the air gap. Small changes in the magnetic field are obtained by controlling the field current with a multi-turn Helipot potentiometer.

An experimental model of the NBS Magnetic Attenuator which uses polyiron as the dissipative element was operated at frequencies from 1000 to 3000 Mc. Variations in the losses of the polyiron were produced which were large enough to reduce the attenuation 60 percent, change the power by a ratio greater than 60:1, with voltage standing wave ratio always less than 1.5.

More recently, a study was made at NBS of an attenuator that employs a slug of Ferramic B ½ inch long and ⅜ inch in diameter as the dissipative medium. The dependence of the losses in the material on frequency was remarkably demonstrated by this experiment. At 2200 Mc the attenuation was reduced from 17 db to less than ½ db, and less than 45 milliamperes of current was required to maintain the magnetic field. At a frequency of 2600 Mc, changes in attenuation greater than 20 db were obtained with the same electromagnet currents. To avoid saturation in the iron core of the small, low current electromagnet, a larger unit was used to obtain greater changes in attenuation. At several frequencies, attenuation changes in



SYLVANIA PLUGS THE 16,000 MC GAP

with the new 1N78 Silicon Crystal Mixer

Sylvania adds another to the world's widest Silicon Crystal Mixer line – the 1N78 for 16,000 mc, one of the newest SHF bands. This new diode is the latest product of Sylvania's continuing exploration into frequency conversion in microwave regions.

Better and better performance at existing frequency bands and new designs for tomorrow's frequencies are both to be expected of Sylvania's advanced research and long experience in Silicon Diode technology.

Sylvania also makes Silicon Crystal Video Detectors for use as microwave detectors in receivers of non-heterodyne type. Other Sylvania products engineered for radar and SHF receivers include magnetrons, TR tubes, ATR tubes and hydrogen thyratrons.

Sylvania Silicon Mixer Diodes		
Type	Construction	Design Frequency (Approx.)
1N25	Cartridge	1000 mc.
1N21B	Cartridge	3000 mc.
1N23B	Cartridge	10,000 mc.
1N78	Coaxial	16,000 mc.
1N26	Coaxial	24,000 mc.
1N53	Coaxial Miniature	Above 30,000 mc.

Write for this 16-page book, "Microwave Crystal Rectifiers," including the new 1N78 characteristics and ratings.

Sylvania Electric Products Inc.
Dept. E-1309, Emporium, Pa.

Please send me the "Microwave Crystal Rectifiers" booklet, including data on the 1N78.

Name_____

Company_____

Street_____

City_____ Zone___ State_____

SYLVANIA

SYLVANIA ELECTRIC PRODUCTS INC. 1901–1951 50th ANNIVERSARY FIVE DECADES OF PROGRESS

ELECTRONIC DEVICES; RADIO TUBES; TELEVISION PICTURE TUBES; ELECTRONIC TEST EQUIPMENT; FLUORESCENT TUBES, FIXTURES, SIGN TUBING, WIRING DEVICES; LIGHT BULBS; PHOTOLAMPS; TELEVISION SETS

WE DON'T LIKE TO BRAG,
BUT . . . modestly enough, we
have reason to be proud of
the Tarzian TT-5 Tuner
It's a fact. The Tarzian TT-5 Tuner is a better tuner; made by the largest manufacturer of switch-type tuners. It's an outstanding engineering accomplishment—interference free —providing highest gain . . . lowest noise.
ALSO—
LOW OSCILLATOR RADIATION . . . GOOD MATCHING . . . GOOD INPUT BALANCE . . . UNIFORM VERNIER RANGE ON LOW AND HIGH CHANNELS . . . AVAILABLE 21 OR 41 MEGACYCLES IF.
A WORD ABOUT UHF!
We'll be glad to work with you when you're planning UHF. And, remember, Tarzian is the only manufacturer of front end tuners now supplying 41 megacycle units. As a matter of fact, we now have more than ½ million 41 mc. tuners in the field.
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TUNER DIVISION
Bloomington, Indiana
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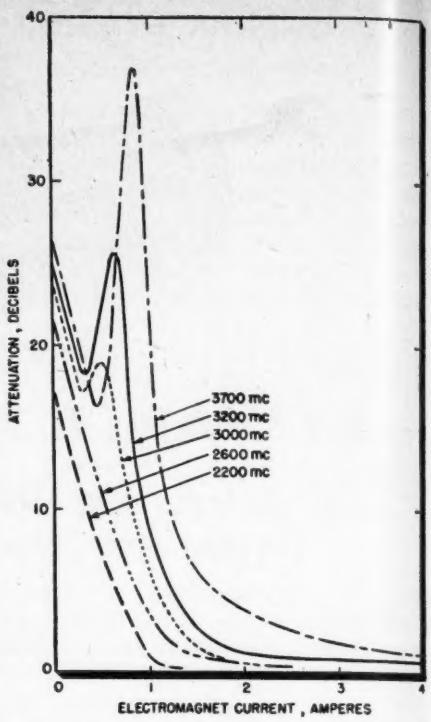

Fig. 4: Curves showing effect of ferromagnetic resonance as operating frequency is increased, 2200 to 3700 MC

excess of 95% have been obtained without difficulty.

While operating at a frequency of 3200 Mc, a striking example of ferromagnetic resonance was exhibited. As the electromagnet current was increased, the attenuation decreased from its initial value of 24 db to about 18 db, then peaked to about 25 db, and finally decreased to approximately 1 db. The peak occurred at a current of approximately 0.6 amperes. When operating at 3700 Mc, a similar phenomenon occured. The initial attenuation of 26 db was reduced to about 16 db before peaking to 37 db; finally it dropped to about 1 db as the current continued to increase. The resonance effect appeared when the electromagnet current was approximately 0.8 ampere.

When the magnetic field is rotated 360° about the axis of some of these coaxial attenuators, a position may exist where the field has its maximum effect. For instance, when a magnetic field of constant intensity was rotated about the axis of the above coaxial attenuator operated at 3700 Mc, changes in attenuation of 17 db were obtained. However, this rotational phenomena does not exist for all materials used in these attenuators.

Many applications of this magnetic phenomenon are immediately evident. An audio source can be used to vary the electromagnet current which produces a changing field in

the attenuator and consequently amplitude-modulates the r-f signal. The resultant modulation envelope includes the predominant second and higher harmonic frequencies of the audio frequency field. However, these harmonies can be readily eliminated by employing a d-c bias about which the a-c field oscillates. The use of the NBS Magnetic Attenuator in this fashion permits amplitude modulation of UHF and microwave oscillator outputs without the frequency modulation effects which occur when the oscillator is modulated directly.

The NBS Magnetic Attenuator is equally adaptable as an output stabilizer for microwave oscillators. The unit can be part of a degenerative feedback circuit in which the magnitude of the field produced by the electromagnet is controlled by a small amount of r-f power taken from the coaxial transmission line. Another magnetic unit may also be utilized in such a feedback network. The rectified control voltage coupled from the transmission line may be applied to a magnetic amplifier which controls the electromagnet field directly.

Current NBS investigations are being directed toward finding better and more efficient dissipative materials. Among the latest group of materials under study are magnetic ferrites, which yield greater attenuation changes for a given electromagnet current than does polyiron. These ferrites should thus make possible the use of smaller currents to produce the same changes of attenuation.

A waveguide attenuator using similar principles is described in "Magnetically Controlled Waveguide Attenuator" by Theodore Miller, Journal of Applied Physics, **20**, 878, (September 1949).

UHF Converter

(*Continued from page* 38)

ently good noise factor. This circuit consists of a neutralized grounded cathode input section followed by a grounded grid stage.

Both the input grid and the interstage circuit of the cascode are adjusted to have bandwidths of about 12 MC., i.e., to include both Channels #5 and 6. The plate of the output triode, however, is adjusted for a 6 MC. bandwidth and a switch is provided on the rear of the chassis to select the desired channel. Economy is achieved by the use of a simple slide switch as a channel selector which varies the value of capacity in series with the plus B end of the plate tuning coil. Balanced output is used in order to eliminate interference pickup on the

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CAPACITANCE COMPARATOR

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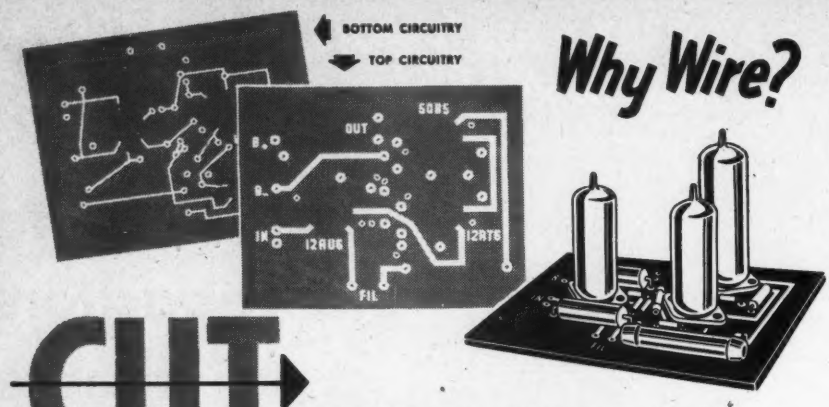

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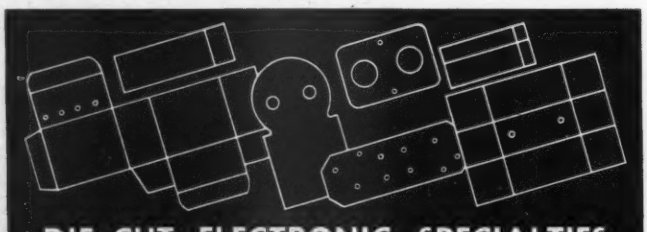

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lead coupling the converter to the VHF receiver.

Since most television receivers have no provision for supplying power to an external converter, this converter is self-powered. Both chassis height limitations and power economy dictated the use of a selenium rectifier in preference to a vacuum tube, but a power transformer is used to eliminate hum interference between converter and television receiver.

AC power for the television receiver can be secured from the rear of the chassis, and a switch on the converter energizes both units and selects either VHF or UHF reception.

The heaters of the converter tubes remain on for both types of reception with a plus B switch being provided in the ground return of the power transformer secondary. Switching in this manner allows instantaneous change from VHF to UHF and also removes the voltage from the converter filter condensers during VHF operation.

Input terminals for both VHF and UHF antennas are provided on the rear of the chassis. When receiving signals on Channels #2 to 13, the VHF antenna is directly connected to the television receiver input. For reception on Channels #14 to 84, a separate UHF antenna may be used, or if signal conditions allow, either the VHF antenna or a built-in cabinet antenna may be selected.

Pioneer Awarded Contracts

The Army Signal Corps has awarded contracts totaling a quarter of a million dollars to the Pioneer Electronics Co. of Santa Monica, California, for the manufacture of radar tubes.

General Radio Expands Plant

The General Radio Co. is starting construction of a new plant in Concord, Mass. For the past thirty-six years, the executive offices and manufacturing facilities of the company have been located entirely at Cambridge, Mass. Although a substantial tract of land zoned for industrial use has been acquired in West Concord, all of the Cambridge facilities will be maintained, at lest for the near future. The new plant will be a modern three-story brick-faced building of 72,000 sq. ft. and will provide facilities for about two hundred employees. Construction is expected to start immediately.

Color-TV

(*Continued from page* 39)

the excellent color quality of the laboratory-produced pictures. The generating equipment was very flexible and many combinations were readily demonstrated. Space is not available to describe these.

The RCA equipment consisted of a large-screen projection receiver, a tri-color tube receiver, a flying-spot slide scanner plus studio pickup of "live" subjects. The number of system variations available was large and their effects on the picture were clearly shown. Some of these were: (a) the conspicuousness of dot structure in monochrome receivers (compatibility); (b) color stability; (c) spurious colors due to cross-talk and (d) color resolution.

The fidelity of the reproduced picture on the tri-color tube can be judged by the fact that in a side-by-side comparison with an optically projected image of the same scene, some of the engineers could not tell which was which!

Actually neither entertainment value nor artistic reproduction was the aim of any of the tests. In fact, Philco purposely chose to demonstrate at its Field Laboratory, a location where reception is difficult due to weak signals and strong interference from nearby automotive traffic, so that the effect of a radio link could be observed. The slide scanner was at WPTZ in Philadelphia, about 21 miles from the tri-color tube receiver at Morrisville, Pa. System variables were changed while results were noted on a color picture, sometimes nearly submerged in ignition interference. Under these practical conditions it appeared that picture quality improved with increasing sub-carrier amplitude, contrary to earlier laboratory observations.

It is not possible to mention the dozens of test combinations observed during these four days of tests. NTSC was pleased that the FCC detailed their engineers—the four who have been most concerned with color television—to witness all of these tests.

RCA Converts Camden Unit for Defense Production

An additional manufacturing unit to be devoted solely to the production of electronic equipment for the national defense effort will be established in the Camden works of the RCA Victor Division, Radio Corporation of America. Various types of radar equipment will be produced.

Here's why those in the know –demand

CANNON PLUGS

Patented exclusive latchlock device
Shell design saves space.
All contacts, machined from solid bar stock, electroplated with silver.
Socket contacts are full-floating . . . turn through 360°.
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Compression gland having a soft rubber bushing grips the cable; fibre washer takes care of bushing thrust. Cable entry has strain relief spring.

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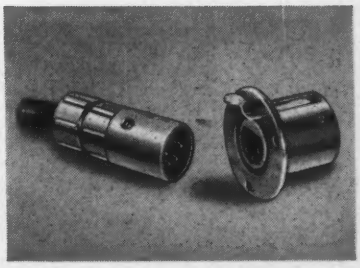

There are 12 items in the XL line. Insert arrangements available: 3—15 amp. contacts, 4—10 amp. contacts—working voltage 250 volts. Zinc and steel plugs with bright nickel finish are standard. Satin chrome finish also available on steel plugs.

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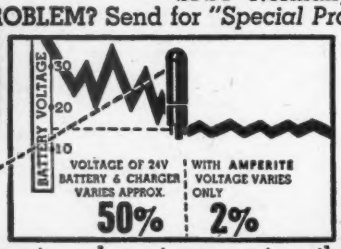

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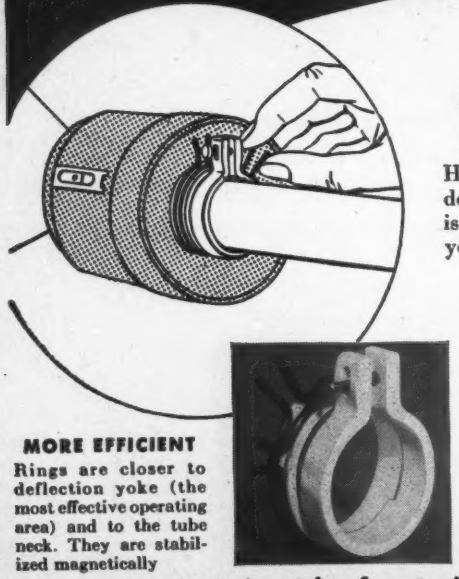

Here is the simplest of all centering devices for the new electrostatic tubes. It is also the most efficient and positive—as your own tests will prove.

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MORE EFFICIENT
Rings are closer to deflection yoke (the most effective operating area) and to the tube neck. They are stabilized magnetically

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MILITARY CONTRACT AWARDS

Manufacturers who have received contract awards for producing of radio-radar-electronic equipment for the Armed Services are listed below by name, city and equipment. Subcontractors interested in bidding on performance of any part of each contract should sell their services to these prime contractors. This list, which is current up to our press time, covers the period from July 5 to August 1.

Antennas

Allied Aircraft Co., N. Hollywood, Calif.; American Phenolic Corp., Chicago, Ill.; Camfield Mfg. Corp., Grand Haven, Mich.; General Electric Co., Syracuse, N. Y.; Engineering & Research Corp., Hyattsville, Md.; Heyer Products Co., Belleville, N. J.; E. J. Johnson Co., Waseca, Minn.; RCA Victor Div., Radio Corp. of America, Camden, N. J.; Sylvania Electric Products, New York, N. Y.; Tung-Sol Lamp Works, Newark, N. J.; Radio Corporation of America, RCA Victor Div., Harrison, N. J.; Western Electric Co., N. Y. City; Westinghouse Electric Corp., Bloomfield, N. J.

Cable Assemblies

American Phenolic Corp., Dayton, Ohio; Colortone Television Co., N. Y. City; Crescent Insulated Wire & Cable Co., Trenton, N. J.; Lowell Insulated Wire Div., Overlakes Corp., Lowell, Mass.; The Okonite Co., Passaic, N. J.; Phoenix Cords, Inc., and Elmco Co., Hillside, N. J.; U. S. Rubber Co., N. Y. City.

Capacitors

Corning Glass Works, Corning, N. Y.; Allen D. Cardwell Mfg. Corp., Plainville, Conn.; E. F. Johnson Co., Waseca, Minn.; Electro Motive Mfg. Co., Willimantic, Conn.; Radio Wire Television, Inc., N. Y. City; Sprague Electric Co., North Adams, Mass.; Wilcox Electric Co., Kansas City, Mo.

Connectors

American Phenolic Corp., Chicago, Ill.; Cannon Electric Co., Los Angeles, Calif.; Kings Electronics Co., Tuckahoe, N. Y.; Magnavox Co., Fort Wayne, Ind.; The Pyle National Co., Chicago, Ill.; RCA Victor Div., Radio Corp. of America, Camden, N. J.; Siltronic Co., Pittsburgh, Pa.; United Transformer Corp., N. Y. City; Utility Electronics Corp., Newark, N. J.; Western Electric Co., N. Y. City.

Crystal Units

General Electric Co., Syracuse, N. Y.; Keystone Electronics Co., Stamford, Conn.; Pacific Electronics, Los Gatos, Calif.; Polytech Devices, Elizabeth, N. J.; Sheroid Crystal Corp. and Espey Mfg. Co., Kansas City.

Generator Sets

Beech Aircraft Corp., Wichita, Kansas; Buda Co., Harvey, Ill.; Continental Electric Co., Newark, N. J.; Westinghouse Electric Corp., Dayton, Ohio.

Electron Tubes

Amperex Electronic Corp., Brooklyn, N. Y.; Bomac Laboratories, Beverly, Mass.; E. Thomas Casellini, Kemptron Electron Prods. Co., Salem, Mass.; Chatham Electronics Corp., Newark, N. J.; Allen B. DuMont Labs., East Paterson, N. J.; Eitel-McCullough, San Bruno, Calif.; Federal Engineering Co., New York City; General Electric Co., Schenectady, N. Y.; Haydu Brothers, Plainfield, N. J.; Hytron Radio & Electronic Corp., Salem, Mass.; Kuthe Labs., Newark, N. J.; Machlett Laboratories, Springdale, Conn.; National Union Radio Corp., Orange, N. J.; Raytheon Mfg. Co., Power Tube Div., Waltham, Mass.; Sonotone Corp., Elmsford, N. Y.

Headsets

Connecticut Telephone & Elec. Corp., Meriden, Conn.; Consolidated Radio Products Co., Chicago, Ill.

Indicators

Bendix Radio Div., Bendix Aviation Corp., Baltimore, Md.; Blackstone Mfg. Co., Chicago, Ill.; Keystone Watch Case Div., Riverside Metal Co., Riverside, N. J.; Kollsman Instrument Corp., Elmhurst, N. Y.; Magnavox Co., Ft. Wayne, Ind.; Ryan Industries, Detroit, Mich.; Schwien Engineering Co., Los Angeles, Calif.; Sperry Gyroscope Co., Great Neck, L. I.; Weston Electrical Instrument Corp., Newark, N. J.

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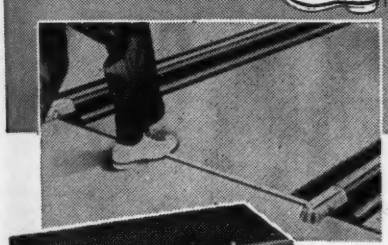

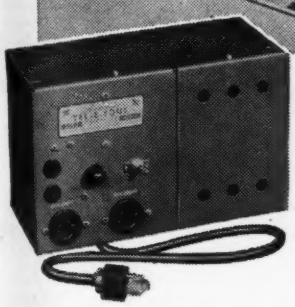

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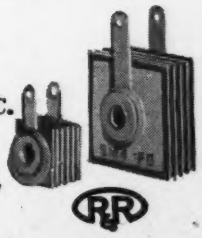

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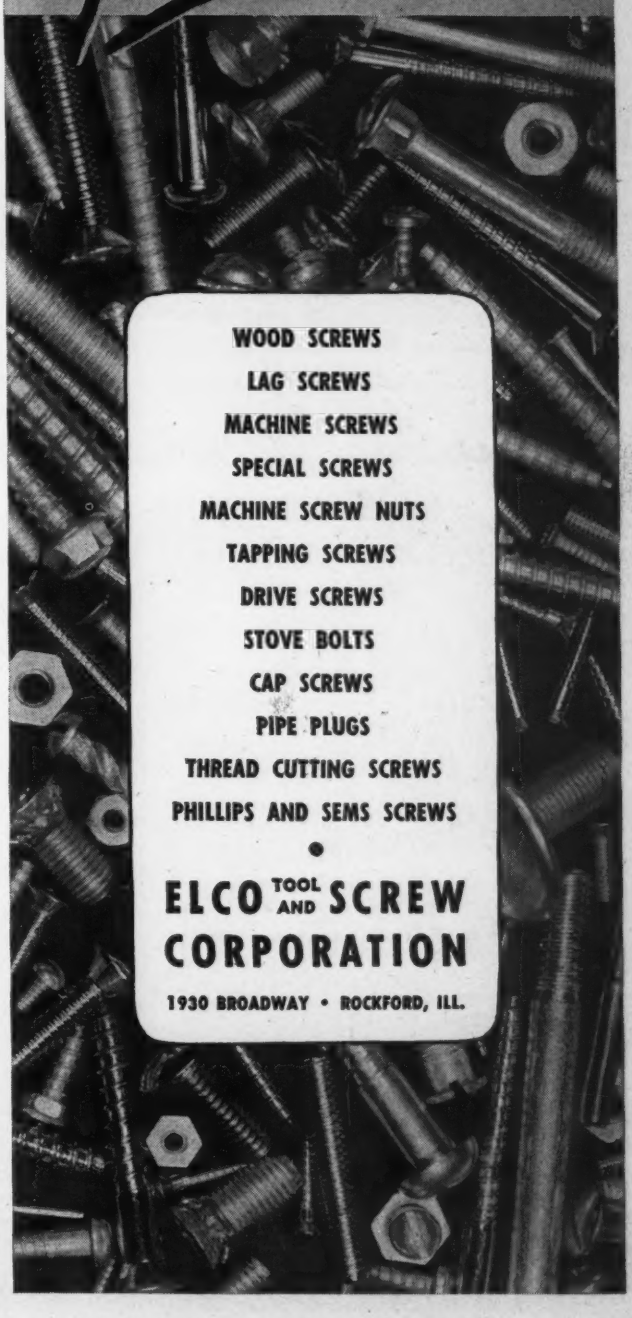

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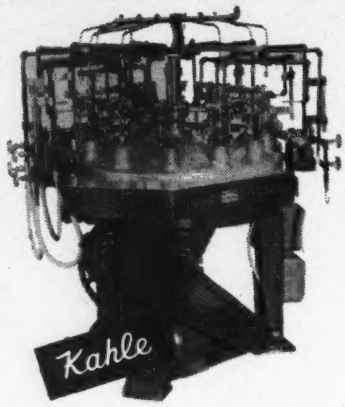

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MODEL 71

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Microphones

Permoflux Corp., Chicago, Ill.; Shure Brothers, Chicago, Ill.

Power Supplies

Cornell-Dubilier Electric Corp., Plainfield, N. J.; P. R. Mallory & Co., Indianapolis, Ind.; Pioneer Gen-E-Motor Corp., Chicago, Ill.

Radar Equipment

Bendix Radio Div., Bendix Aviation Corp., Baltimore, Md.; General Electric Co., Syracuse, N. Y.; Harvey Wells Electronics, Southbridge, Mass.; Radio Corporation of America, RCA Victor Div., Camden, N. J.; Transducer Corp., Boston, Mass.

Relays

Bendix Radio Div., Bendix Aviation Corp., Baltimore, Md.; Continental Electronic, Brooklyn, N. Y.; Phostron Co., South Pasadena, Calif.; Sylvania Electric Products, Buffalo, N. Y.

Rectifiers

General Electric Co., Dayton, Ohio; Rapid Electric Co., N. Y. City.

Resistors

Bond Electronics Corp., Summit, N. J.; Corning Glass Works, Corning, N. Y.; P. R. Mallory & Co., Indianapolis, Ind.; Polytechnic Research & Development Co., Brooklyn, N. Y.; RCA Victor Div., Radio Corp. of America, Camden, N. J.; Sprague Electric Co., North Adams, Mass.; Wilkor Products, Cleveland, Ohio.

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Automatic Radio Mfg. Co., Boston, Mass.; Automatic Electric Sales Corp., Chicago, Ill.; Federal Telephone & Radio Corp., Clifton, N. J.; Western Electric Co., N. Y. City.

Test Equipment

Bird Electronics Corp., Cleveland, Ohio; Dyna-Labs, N. Y. City; Electronic Prods. Co., Mt. Vernon, N. Y.; Espey Mfg. Co., N. Y. City; General Communication Co., Boston, Mass. General Radio Co., Cambridge, Mass.; Hickok Electrical Instrument Co., Cleveland, Ohio; Loral Electronics Corp., N. Y. City; Munston Mfg. & Service Co., Islip, L. I.; Reiner Electronics Co., N. Y. City; Shallcross Mfg. Co., Collingdale, Pa.; Stoddart Aircraft Radio Co., Hollywood, Calif.; Triumph Mfg. Co., Chicago, Ill.

Transformers

Airdesign, Inc., Upper Darby, Pa.; American Gas Accumulator Co., Elizabeth, N. J.; Automatic Mfg. Corp., Newark, N. J.; Barker & Williamson, Upper Darby, Pa.; Bendix Radio Div., Bendix Aviation Corp., Baltimore, Md.; Freed Transformer Co., Brooklyn, N. Y.; General Electric Co., Syracuse, N. Y.; Lionel Corp., N. Y. City; Raytheon Mfg. Co., Waltham, Mass.; Rauland-Borg Corp., Chicago, Ill.; Standard Coil Products Co., Inc., Los Angeles, Calif.; Standard Transformer Co., Chicago, Ill.; Triad Transformer Mfg. Co., Los Angeles, Calif.; United Transformer Co., N. Y. City; Westinghouse Electric Corp., Baltimore, Md.

Transmitters and Receivers

Communications Co., Coral Gables, Fla.; Bendix Radio Div., Bendix Aviation Corp., Baltimore, Md.; Emerson Radio & Phonograph Corp., N. Y. City.; Federal Telephone & Radio Corp., Clifton, N. J.; Hoffman Radio Corp., Los Angeles, Calif.; Lavoie Laboratories, Morganville, N. J.; Radio Marine Corp. of America, N. Y. City; Pacific Mercury Television Mfg. Co., Van Nuys, Calif.; Sierra Electronic Corp., San Carlos, Calif.

Magnecord Service Depot Serves Western States

Manufacturers Electronic Service, Santa Monica, California has been approved by Magnecord Inc., manufacturers of high fidelity tape recorders, as its West Coast service station.

Measuring TV Amplitude

(*Contined from page* 31)

cies of the 15 KC waveform are close together and not readily distinguishable but the envelope is clearly defined.

From left to right the pattern covers a frequency range from F—5 MC to F+5 MC. The relative response of the transmitter at any frequency is given by the distance between the top and bottom of the envelope at the position corresponding to that frequency. The distance can be measured by means of a transparent scale in front of the oscillograph screen.

For a short time during each sweep, the wobbulator frequency is within 15 KC of the carrier frequency and during this time all three difference frequency outputs from the second mixer are passed by the filter. This produces a large vertical "birdie" and conveniently serves to indicate the position of the carrier on the pattern. The positions of other frequencies on the pattern can be indicated by means of a video frequency marker coupled to the video input of the transmitter as shown in the block diagram.

The photograph in Fig. 3 was obtained with a 500 watt transmitter which employs a notching filter to assist in obtaining the required lower sideband attenuation. The position of the carrier is indicated by the large "birdie" in the center of the pattern. The response of the lower sidebands to the left of the carrier is maintained to about 500 KC below the carrier and then decreases rapidly to almost zero at 1.5 MC which corresponds to the resonant frequency of the notching filter. The response rises again below this frequency, but does not exceed 10% of the amplitude of the sidebands close to the carrier. The relative amplitudes of the upper sidebands are shown to the right of the carrier. The response decreases slightly up to 1.5 MC, rises again up to 3 MC and then falls off so that it is about 3 db down at 4 MC. The position corresponding to these frequencies is shown by means of the marker which puts small notches in the pattern at equal distances above and below the carrier. These notches are not shown in the photograph.

This shape of pattern is characteristic of the type of circuit used in this transmitter, i.e., a pair of coupled tuned circuits with a notching filter coupled to the secondary circuit. By using this sweep method for indicating the response, the effects produced by varying the

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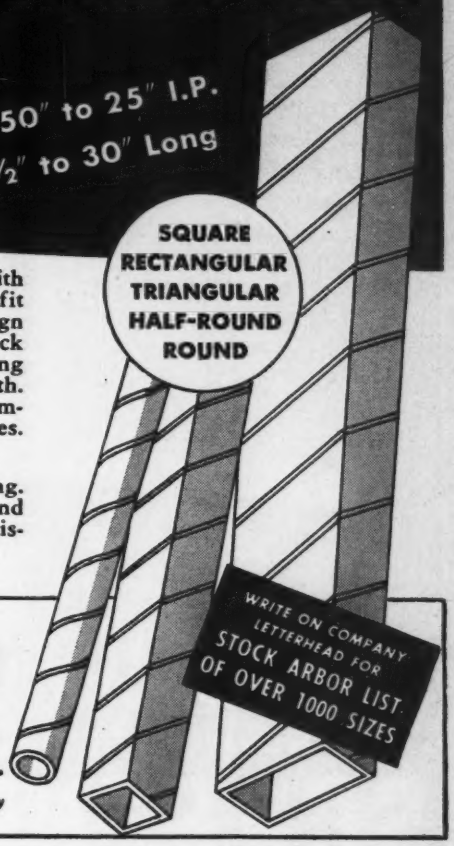

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transmitter adjustments can be readily observed and the transmitter circuits can be rapidly adjusted to produce the desired response in the pass band and the desired lower sideband attenuation.

Description of Circuit

The equipment required for this sweep method of measurement can be quite simple as indicated by the schematic in Fig. 4.

The circuit shown has been simplified mainly by the omission of power supply components. The wobbulator is a conventional push-pull oscillator with its tuning capacitor driven by a synchronous motor. The signal of frequency F-15 KC is generated by the crystal oscillator and tripler and is mixed with a signal from the wobbulator in the two-crystal video mixer. The output from the mixer passes through an r-f filter and a dividing network, and is fed to the transmitter video input terminal.

The dividing network, consisting of the shunt inductor and resistor and the series capacitor, serves to remove the very low frequencies from the signal fed to the transmitter, and at the same time maintains a constant resistive load on the mixer. The removal of the very low frequencies eliminates the generation of sidebands close to the carrier. This limits the amplitude and spread of the carrier "birdie". An absorption marker is applied to the transmitter input signal with the simple series resonant circuit, the variable capacitor being calibrated for frequencies between approximately 500 KC and 5 MC.

Another signal from the wobbulator is coupled through a small adjustable capacitor to the coaxial cable feeding the mixer probe which is screwed into the output transmission line of the transmitter. The crystal diode in the probe mixes the wobbulator signal with a signal picked up from the transmission line by an inductive loop.

The simple circuit in the probe performs a number of functions. The resistor terminates the cable from the wobbulator and thus enables any length of cable to be used without introducing excessive reflections of the wobbulator signal. The inductor has little shunting effect on the resistor at the wobbulator frequencies, but effectively by-passes it at video frequencies. The capacitor by-passes frequencies above about 100 KC. Hence, all of the difference frequency signals produced by the crystal mixer

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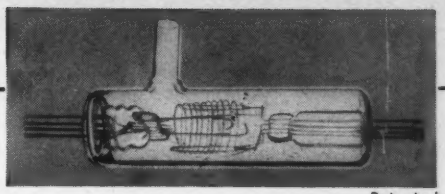
are by-passed to ground except the lower video frequency signals and the 15 KC signal. These signals appear across the capacitor and are fed back down the cable. Since they are of relatively low frequency, no objectionable reflections are produced with any reasonable length of cable. The signals are tapped off through an r-f choke and fed to the 15 KC filter which selects the 15 KC signal and feeds it to the oscillograph.

In order to obtain accurate measurements with this circuit, it is necessary that the swept video frequency input to the transmitter shall be of constant amplitude and that the amplitude of the 15 KC output from the probe shall be linearly proportional to the desired sideband amplitude. This is assured without any critical adjustments by simply making the signals fed to the two mixers from the wobbulator large compared with the signals from the tripler and pick-up loop respectively. It is not then necessary that the output from the wobbulator remain constant throughout the sweep.

Physical Layout

It is seen from Fig. 4 that the complete circuit, with the exception of the small mixer probe, can be conveniently assembled in a single unit shown enclosed by the broken lines. Photographs of a unit using this circuit are shown in Fig. 5. It is complete with its power supply and measures approximately 9" x 7" x 7". The underneath view shows the shield down the center which divides the wobbulator on the right from the crystal oscillator and tripler on the left. Signals are fed through from the wobbulator and tripler to the video mixer on the other side of the chassis. On the extreme left are the power supply transformer, rectifier tube, etc, and on the extreme right are the components for the 15 KC filter. The top view shows the video mixer crystals in the center with the r-f filter and marker circuit extending to the front panel. The calibrated scale for the marker can be seen at the top center of the front panel.

The unit shown in the photographs is suitable for making measurements on any television transmitter by simply coupling the mixer probe to its output transmission line and connecting a cable to its video input terminal. The accuracy of the measurements is, in general, limited only by the linearity and resolution of the oscillograph. With most commercially available oscillographs, the accuracy is more than adequate to determine whether or not the trans-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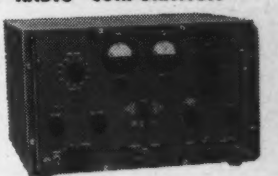

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mitter is operating according to requirements, i.e., with regard to lower sideband attenuation and uniformity of response in the pass band.

A number of other measurements can be made on the transmitter by means of this unit. For instance, the amplitude frequency response can be measured by disconnecting the probe from the unit and connecting the probe directly to the oscillograph. The probe then rectifies a sample of the transmitter output and feeds the oscillograph a signal proportional to the peak r-f output voltage. This is determined by the percentage modulation at any instant, providing the d-c restorer or clamp circuit in the transmitter is disabled. The oscillograph pattern thus shows the variation of the depth of modulation as the modulating frequency is swept from zero to 5 MC. A zero reference line can be obtained by blanking the transmitter input voltage during half of the sweep. This can be achieved by biasing the tripler beyond cutoff as shown in Fig. 4.

It was indicated previously that a unit employing the circuit of Fig. 4 can be used to replace the r-f wobbulators presently built into many television transmitters. It is only necessary to couple a mixer probe to the output circuit of each broadband linear amplifier stage, and to include a switch at point A (Fig. 4). The unit can then be switched to each probe in turn as the appropriate stages are being tuned. The unit then enables each stage to be tuned more accurately than with the r-f wobbulator and it also enables a rapid check to be made of the overall transmission amplitude characteristic under normal conditions of modulation.

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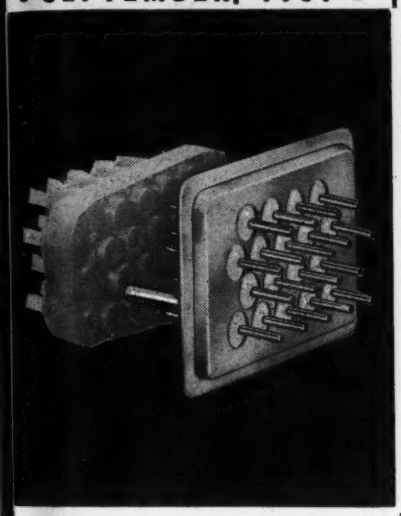

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Audio Amplifier

(*Continued from page 42*)

evaluation and possible military application. A mathematical analysis of the circuit operation was made[1] and the derivation of the gain formula was found to be as follows:

where e_1 = input voltage at grid of first tube
e_2 = driving voltage at grid of second tube
R_1 = plate impedance of first tube
R_2 = plate impedance of second tube
μ_1 = amplification factor of first tube
μ_2 = amplification factor of second tube
R_L = load resistor of second stage
$Z = R_1 — R_2 — R_L$
I = AC current in the system
g = voltage gain of the system

With reference to Fig. 1 one half of the push pull system consists of two triodes and resistor R_L connected in series. The tubes may be considered as ac generators having open circuit voltages u, e, and u_2e_2. The ac current is therefore:

$$I = \frac{\mu_1 e_1 + \mu_2 e_2}{Z}$$

The driving voltage for the second stage is twice the open circuit voltage of the first stage minus the voltage drop through each section of the first tube:

$$e_2 = 2\ (\mu_1 e_1 - I_1 R_1)$$

$$IZ = \mu_1 e_1 + 2\mu_2\ (\mu_1 e_1 - I R_1)$$

$$I\ (Z + 2\mu_2 R_1) = \mu_1 e_1 + 2\mu_1\mu_2 e_1$$

$$I = \frac{e_1\ (\mu_1 + 2\mu_1\mu_2)}{Z + 2\mu_2 R_1}$$

$$= \frac{e_1(\mu_1 + 2\mu_1\mu_2)}{R_1 + R_2 + R_L + 2\mu_2 R_1}$$

$$= \frac{e_1\ (\mu_1 + 2\mu_1\mu_2)}{R_2 + R_L + R_1\ (2\mu_2 + 1)}$$

The output voltage is equal to IR_L and the voltage gain is:

$$G = \frac{IR_L}{e_1} = \frac{(\mu_1 + 2\mu_1\mu_2)\ R_L}{R_2 + R_L + R_1\ (2\mu_2 + 1)}$$

$$G = \frac{\mu_1\ (1 + 2\mu_2)\ R_L}{R_2 + R_L + R_1\ (2\mu_2 + 1)}$$

When the amplification factor of the second tube is large when compared to 1, which is usually the case, the formula may be simplified as follows:

$$G = \frac{2\mu_1\mu_2 R_L}{R_2 + R_L + 2\mu_2 R_1}$$

This formula does not include the loss introduced by the second stage

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biasing network. The reduction in gain is caused by the effect of the network in lowering the output voltage from the first stage and in decreasing the plate impedance of the first stage. To correct gain farmula for this effect, with respect to the first stage, V-1 can be considered as an a-c generator producing the open circuit voltage e_1 with an internal impedance R_1 and a load resistance R_s across which the output voltage e out appears. This voltage is equal to the open circuit generator voltage.

$$e = 1 \frac{R_s}{R_1 + R_s}$$

feeding R_1 and R_s in parallel. The gain is, therefore, modified as follows:—

$$\mu_1' = \mu_1 \frac{R_s}{R_1 + R_s}$$

$$R_1' = \frac{R_1 R_s}{R_1 + R_s}$$

Applying the uncorrected formula to a working model, the voltage gain was calculated to be 308. Incorporating the corrections the voltage gain was calculated to be 304. This calculated gain figure was found to be very close to the actual value obtained from tests on various models of the amplifier.

Laboratory constructed models of this system were tested and the following features were apparent:—

Frequency response 20 cps to 20,000 cps ± .5 db
Distortion (harmonic) less than 2%
Distortion (intermodulation) less than 6%
Internal noise (including hum) minus 65 db
Overall gain 72 db (including an input transformer)
Good operational stability

Several of the engineers at the Signal corps Engineering Laboratories, who were either connected with the testing of this amplifier, or who heard its operation, constructed amplifiers of this type for home use. These amplifiers have been in constant use during the past two years and have been found to be satisfactory in every respect. It has been determined that the operational stability of the amplifier required that adjustment of the centering control was only necessary when worn out or defective tubes were replaced.

Fig. 3 illustrates a commercially fabricated military version of the amplifier. Fig. 4 shows a homemade model of the system constructed by F. J. Petschauer of PA Systems Unit CSL. The performance characteristics for this amplifier are shown in Fig. 12. Fig. 5 shows the schematic wiring diagram and component parts.

Acknowledgment is made for the assistance received from I. G. Pacent of the Pacent Engineering Corp., 79 Madison Avenue, New York City, at the time of construction of the preliminary experimental models.

[1] Investigation of the system made by Dr. G. Guttwein, Squier Signal Laboratory, Fort Monmouth, N. J.

Congress Acts on '52 Funds for Military

At press time the editors of TELE-TECH were advised of House of Representative's action on new military appropriations for the fiscal year 1952.

The new bill itemizes electronic-communication requirements valued at $3.2 billion. The breakdown is as follows:

Signal Corps	$ 642,200,000
Navy	1,447,000,000
Air Force	1,188,321,000

Actual obligational authority for fiscal 1952 procurement has been estimated to be:

Signal Corps	$ 782,914,000
Navy	570,357,000
Air Force	387,369,000

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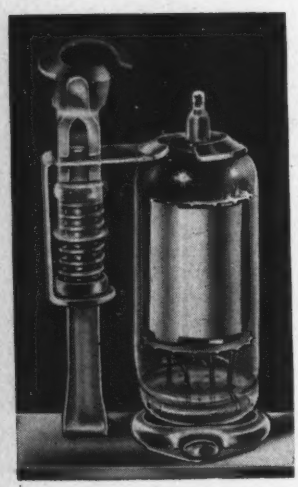

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TELEVISION CHAIN

(*Continued from page* 36)

gram audio in one phone and directions in the other or both in one phone if desired. Cameraman may also "call" the camera control unit, and talk on a private circuit when the CCU operator depresses his intercom switch.

Focus Servo Amplifier Chassis: This unit contains the servo amplifier and the blower used to draw cooling air over the face of the image orthicon tube.

Focus Servo Circuit: The Focus Servo Circuit (Fig. 4) consists of a two-stage servo amplifier using a twin triode as an amplifier and a phase splitter and two push-pull tetrodes whose unbalanced output is fed through a single ended transformer into the motor section of the focus drive motor. The focus drive motor also contains a generator portion, and both the generator and motor fields are supplied from a 75 volt tap of the transformer T-2.

The generator output is in series with the controlling voltage and acts as a damping or feedback voltage. The amplitude of feedback is changed in accordance with the magnitude of the feedback resistors in the lens

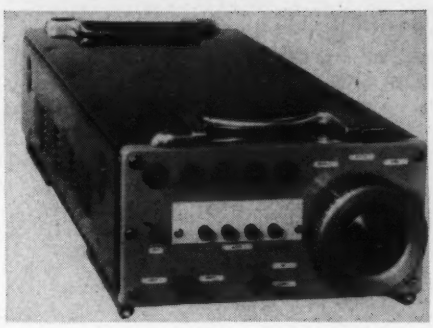

Fig. 7: Front view of remote control unit

mounts. On extended range a diminishing amount of damping is required, therefore this winding is shunted by a 68 ohm resistor mounted on the focal range switch.

The focus controls on the sides of the camera and at the remote control box are wire wound potentiometers of 1000 ohm value. They are shunted across the 10 volt tap of the 100 volt winding on the transformer T-2. The sliding arm of the potentiometer is grounded. The 100 volt winding returns through the range resistor in the lens mount, thence through the 10,000 ohm focus range potentiometer R-6. Thus the voltage across R-6 may vary from a maximum of 100 volts if the range resistor contacts are shorted, to 10 volts where the range switch has been switched to extended or open contact.

There is an 91,000 ohm limiting resistor to assure that the voltage developed across the resistor will be 10 volts. This resistor is R-7, thus it is shown that resistor R-6 will have across it, in the case of the longest focal length lens, a voltage difference of 10 volts; and in the case of the shortest lens, a voltage difference of 100 volts. The input to the servo amplifier is an unbalanced input and it is connected to one side of the generator windings of the servo generator unit. The other side of the windings is connected to the moving arm of the potentiometer which is mechanically driven from the gear box.

Operation of Circuit

The operation of the circuit is as follows: When the focus control potentiometer is moved from its initial position, a voltage difference is developed between this control and the motor-driven potentiometer R-6. This

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error voltage is sent through the amplifier into the motor armature whose phase is such as to cause the motor to turn in the direction which will try to diminish the voltage difference. As the motor turns, the generator voltage is injected in series opposition so as to prevent the system from over-shooting and hunting.

In extended range, the shunting resistor across the generator winding is 68 ohms so as to diminish the amount of feedback due to the longer and faster motion of the portion of the sliding arm of the motor-driven potentiometer R-6.

In the normal range, the voltage across R-6 is determined by the size of the resistor in each lens mount so that the ratio of voltage across the motor-driven potentiometer to the focus control potentiometer equals the gear ratio. In the extended range, the voltage across R-6 is approximately 10 volts; therefore, the gear ratio in the servo system is 1:1.

Part Two of this paper will appear in the October issue.

CAVITY ANTENNA FOR JET AIRCRAFT

(*Continued from page* 33)

sumptions regarding transmitter power, transmitting antenna directivity, mismatch loss, cable loss, and antenna effective height are also given in the appendix. The calculations are made for conditions over good soil. They also apply for conditions over poor soil since the propagation factor given for this set of conditions is approximately the same for both poor and good soil.

These calculations show that the glide path antenna will give a signal of greater than the required minimum strength of 70 micro-volts for all angles where the equi-signal diagram of Fig. 5 indicates a field strength greater than 1.26 millivolts per meter. Fig. 5 shows that the antenna signal for the important cone angles between +20° and —20° is greater than the required minimum at all azimuth angles within 90° of the aircraft line of flight.

Part Two of this paper will appear in the October issue.

Defense Contracts

(*Continued from page* 29)

curement analyses as being fairly representative. They do not appear to be isolated actions, designed to favor the picture one way or the other. The figures speak for themselves. The conclusions are as you draw them.

It is only fair to state that all inquiries and discussions which TELE-TECH editors have had with Department of Defense officials, have given evidence that a determined effort is being made to achieve equitable distribution of defense contracts throughout industry.

TELE-TECH is presently conducting a thorough survey of radio-electronic manufacturers to determine the extent of prime and subcontracting in our particular field. Manufacturers' response is highly encouraging and we hope to present exclusive and dramatic results, when the survey is completed, reflecting the extent of defense contracting and dollar value among radio-electronic manufacturers.

It is anticipated that this information will be available in time for publication in TELE-TECH's October issue.

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UHF TV RECEPTION

(*Continued from page* 42)

port. There is no line-of-sight and the building is surrounded by tall office buildings on all sides. If a comparison were to be made, I would judge this point to be as inferior a location as you could select. We installed a parabola antenna approximately 30 feet high on the roof, oriented it approximately 20 degrees off actual direction and receive pictures in quality about 70% of those in Bridgeport. Here we used a General Electric 17C-103 receiver and G. E. Translator. Lead-in is 300-ohm tubular.

Another location is at the Union League Club, also in downtown New Haven. This installation is on the third floor and also has the problem of tall buildings on all sides. Similar antenna installation to that of WELI was made and the quality of the picture again is about 70%. Here the tests are conducted with a Zenith H2052R receiver provided with the Zenith UHF strip. The distance again is approximately 18 air miles from Bridgeport. The antenna is pointed directly to the station.

To give you some idea of residential installations, we have had installed UHF receivers or converters in some ten locations of WELI personnel in the New Haven area. A typical installation is in the home of Charles Wright, WELI program director, in West Haven approximately 15 air miles from Bridgeport. This location is in extremely hilly country with a rise blocking line of sight directly in the path of true direction to Bridgeport. Here we've installed a ten foot mast on top of his two story building. The antenna used is a stacked-Vee using 300 ohm tubular lead-in fed into an RCA converter having an in-put of 72 ohms. To achieve a matching impedance we utilize a balance at the converter which gives us some loss. The pictures received are about 85%. The antenna is approximately 40 degrees from true orientation.

Fred King, WELI's chief engineer, lives almost directly in the shadow of West Rock, a rise of some 700 feet in Hamden, about 20 miles from Bridgeport. Here too we have used a stacked-Vee type of antenna with 300-ohm tubular lead-in. His receiver is a Regal using the Standard Coil Products front end with UHF tuning strips added. By orienting almost 90 degrees away from true line we get pictures about 65% perfect quality.

There are many other illustrations I might make. In my own home in Bridgeport, which is as you may know, a sort of proving grounds for all manufacturer's UHF equipment, we are about 5 air miles from the transmitter with a hugh gas storage tank in direct line of sight. By careful orientation of a corner reflector type antenna we get 100% pictures at all times. Through my own personal observation I have not noticed any marked deterioration of picture quality because of foliage, rain, snow or any of the other theories advanced. This of course is not based on measurements, but on observation in an average home over a period of a year and a half.

In closing, I think a word of praise should be given to all receiver manufacturers for the remarkable progress they have achieved in so limited a time in their development of UHF converters and receivers. When UHF finally does go on the air commercially, the public will be able to receive these new stations with their present receivers by adding any of the simple devices which are now ready. And I wonder if anyone has voiced a tribute to RCA-NBC and their far-sighted people for putting the experimental UHF transmitter on the air in Bridgeport. Their's has really been the outstanding contribution to bring about a really competitive nationwide system of television to everyone.

RUDY FRANK

WELI, Connecticut Radio Foundation, New Haven 10, Conn.

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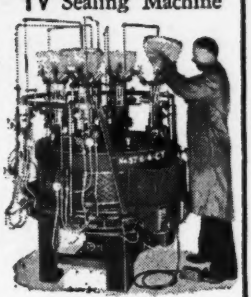

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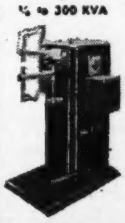

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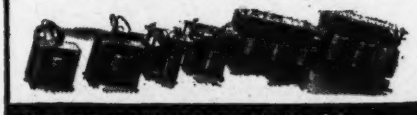

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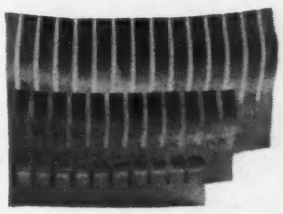

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Remote FM

(*Continued from page* 45)

readings need be taken.

The plate voltage sampling is taken from a voltage divider across the plate supply. The plate current sampling voltage is taken across the meter. The line current indication is rectified voltage from a pickup loop inside the "bazooka" antenna coupling device in the transmitter. The "tower lights" indicating voltage is the rectified and well filtered voltage derived from a current transformer in the tower light circuit. A voltage from this circuit is always proportional to the current passing through the portion of the transformer in the light circuit and thus the number of lights drawing current in the whole circuit. This was calibrated by disconnecting one light at a time and marking the number left burning, on the face of the meter.

At the studio, a Magnavox FM tuner, with the de-emphasis circuit removed, feeds the selective amplifier. This is tuned to amplify the telemetering subcarrier only, rejecting all audio components of the detected FM carrier. The rectified current from this drives the meter. Even though the telemetering subcarrier modulates the FM transmitter only 5%, while programs are modulating it 100%, little, if any, fluctuation of the meter needle occurs. The FM frequency and modulation monitor is also installed at the studios. The r-f power needed to operate this monitor is derived from a stacked Yagi type antenna cut for 92.5 MC, a commercial two stage booster adjusted for FM, and a three stage r-f amplifier illustrated. Extreme care must be exercised in assembling to prevent the possibility of regeneration.

A second FM tuner is provided at the studios to furnish a positive and a negative voltage from its discriminator circuit. The positive voltage is used to operate a signal strength meter to show relative signal strength, and the negative voltage to bias a triode, so that when the carrier fails, and the negative discriminator voltage ceases, the tube conducts, pulling in a sensitive plate relay, which in turn sounds a warning buzzer and lights a brilliant light. A Meissner 8C tuner is used for this unit. A good FM receiver supplies the aural monitor needed. This is provided with a muting relay, which silences it when the microphone is opened. The FM audio level is continuously adjusted according to the monitors at the studio.

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American Communications Corp., 306 Broadway, New York, N. Y.—AD, AF, AI
American Electroneering Co., 5015-19 W. Jefferson Blvd., Los Angeles 16, Calif.—AA, AB, AD, AF, AI
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Hamilton Electronics, 2726 Pratt Ave., Chicago 45, Ill.—AF
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Harvey-Wells Electronics, Inc., North St., Southbridge, Mass.—AF
Heyman Mfg. Co., 300 Michigan Ave., Kenilworth, N. J.—AE
Highland Engineering Co., Main & Urban Sts., Westbury, N. Y.—AF
Holub Industries, Inc., Sycamore, Ill.—AA, AB
Inductograph Prods., Inc., 236 W. 55th St., New York 19, N. Y.—AF
Jamaica Television Mfg. Co., 95-26 Sutphin Blvd., Jamaica 4, L. I., N. Y.—AK
JAMES KNGHTS CO., Sandwich, Ill.—AE
JOHNSON CO., E. F., 206 2nd Ave., S.W., Waseca, Minn.—AA
Jones Electronics Co., M. C., 96 N. Main St., Bristol, Conn.—AA
Kepco Laboratories, Inc., 149-14 41st Ave., Flushing 55, N. Y.—AB, AF
Lansing Sound Inc., James B., 2439 Fletcher Dr., Los Angeles 39, Calif.—AA
Link Radio Corp., 125 W. 17th St., New York, N. Y.—AG, AH, AK
Lowell Mfg. Co., 1531 Branch St., St. Louis 7, Mo.—AG, AH
Lysco Mfg. Co., 82 Herman St., E. Rutherford, N. J.—AF
Midco Mfg. Co., 607 N. 8th St., Sheboygan, Wisc.—AF
Millen Mfg. Co., James, 150 Exchange St., Malden 48, Mass.—AF
Miller Laboratories, August E., 9226 Hudson Blvd., North Bergen, N. J.—AE
Model Rectifier Corp., 1510 Nostrand Ave., Brooklyn 26, N. Y.—AB, AF
Monitor Products Co., 815 Fremont Ave., S. Pasadena, Calif.—AE
Nebel Laboratory, R. E., 1104 Lincoln Pl., Brooklyn 13, N.Y.—AE
Neptune Electronics Co., 433 Broadway, New York 13, N. Y.—AA, AF
O'Brien Electric Co., 5326 Sunset Blvd., Hollywood 27, Calif.—AA, AD, AG
Olesen Co., Otto K., 1534 Cahuenga Blvd., Hollywood 28, Calif.—AD, AG
Onan & Sons, D. W., 3264 University Ave. S.E., Minneapolis 14, Minn.—AB
Opad-Green Co., 71 Warren St., New York 7, N. Y.—AF
Pentron Corp., 221 E. Cullerton St., Chicago 16, Ill.—AF
Piezo Prods. Co., Whitney St., Framingham, Mass.—AE
Precision Piezo Service, 427 Mayflower St., Baton Rouge, La.—AE
Precision Prods., Inc., 719 17th St., N.W., Washington, D. C.—AE
Press Wireless Mfg. Co., Cantiague Rd., Hicksville, N. Y.—AA, AD, AF, AI
RADIO CORP. OF AMERICA, RCA-Victor Div., Camden, N. J.—AA, AB, AD, AE, AF, AI, AJ, AK
RADIO ENGINEERING LABORATORIES, INC., 36-40 37th St., Long Island City 1, N. Y.—AG, AH, AJ
Radio Specialty Mfg. Co., 2023 S.E. Sixth Ave., Portland 14, Ore.—AE
Ram Electronics Inc., S. Buckhout St., Irvington, N. Y.—AB
Ready-Power Co., 11231 Freud Ave., Detroit 14, Mich.—AB, AF
Reeves-Hoffman Corp., 321 Cherry St., Carlisle, Pa.—AD, AE, AI, AJ, AK
Rowe Industries, 1702 Wayne St., Toledo 9, Ohio—AA, AB
Sargent-Rayment Co., 212 Ninth St., Oakland 7, Calif.—AF, AG
SARKES TARZIAN, INC. See Tarzian, Inc., Sarkes
Scientific Radio Service, 4301 Sheridan St., University Pk., Hyattsville, Md.—AE
Shallcross Mfg. Co., Jackson & Pusey Aves., Collingdale, Pa.—AC
Sierra Electronic Corp., 1050 Brittan Ave., San Carlos, Calif.—AA, AF, AI, AJ
Sorensen & Co., Inc., 375 Fairfield Ave., Stamford, Conn.—AF
Standard Electronics Corp., 25 W. 43rd St., New York 18, N. Y.—AA, AB, AD, AE, AF, AI, AJ
Standard Piezo Co., 127 Cedar St., Carlisle, Pa.—AE
Superior Electric Co., 83 Laurel St., Bristol, Conn.—AF
Tartak-Stolle Electronics, Inc., 3970 S. Grand Ave., Los Angeles 37, Calif.—AF
TARZIAN, INC., Sarkes, 539 S. Walnut St., Bloomington, Ind.—AK
Tech Laboratories, Inc., Bergen & Edsall Blvds., Palisades Park, N. J.—AC
TELECHROME, INC., 88 Merrick Rd., Amityville, L. I., N. Y.—AA, AK
Telectro Industries Corp., 35-16 37th St., Long Island City 1, N. Y.—AF
Thordarson-Meissner Mfg. Div., Maguire Industries, 500 W. Huron St., Chicago 10, Ill.—AB, AF
Transmitter Equipment Mfg. Co., 345 Hudson St., New York 14, N. Y.—AD, AF, AI, AJ
U. S. Motors Corp., 584 Nebraska St., Oshkosh, Wisc.—AB
U. S. Recording Co., 1121 Vermont Ave., N.W., Washington 5, D. C.—AA, AB, AD, AF
UNIVERSAL AVIATION CORP., 230 Park Ave., New York 17, N. Y.—AD
Valpey Crystal Corp., P. O. Box 325, Holliston, Mass.—AE
Varian Associates, 99 Washington St., San Carlos, Calif.—AK
Vokar Corp., 7300 Huron River Drive, Dexter, Mich.—AF
Walkirt Co., 5808 Marilyn Ave., Culver City, Calif.—AA
Western Sound & Electric Laboratories, 805 S. Fifth St., Milwaukee, Wisc.—AD
WESTINGHOUSE ELECTRIC CORP., E. Pittsburgh, Pa.—AA, AD, AI, AJ
Westline Electronics Co., 11660 Olympic Blvd., Los Angeles 25, Calif.—AB
Willard Storage Battery Co., 246 E. 131st St., Cleveland 1, Ohio—AB

THIS DIRECTORY

of station and studio equipment, showing products available to broadcasters and communications companies, is intended as a reference and guide for TV-radio-electronic engineers throughout the entire Western hemisphere.

In writing to manufacturers who are listed in the directory or those using advertising space to supplement their listings, please mention TELE-TECH's Station & Studio Equipment Directory.

Such mention will identify you as one of a select professional group for whom TELE-TECH is published.

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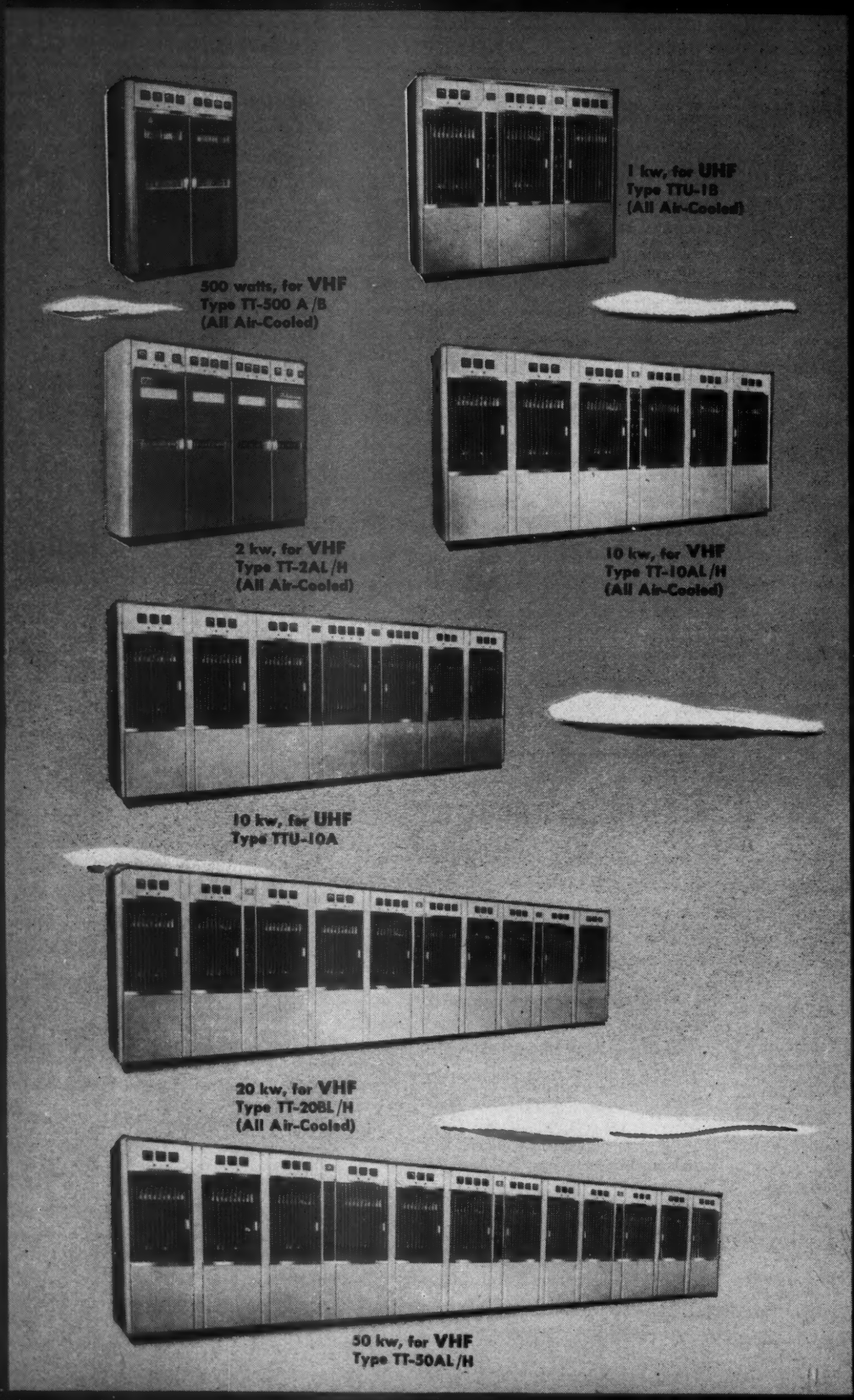
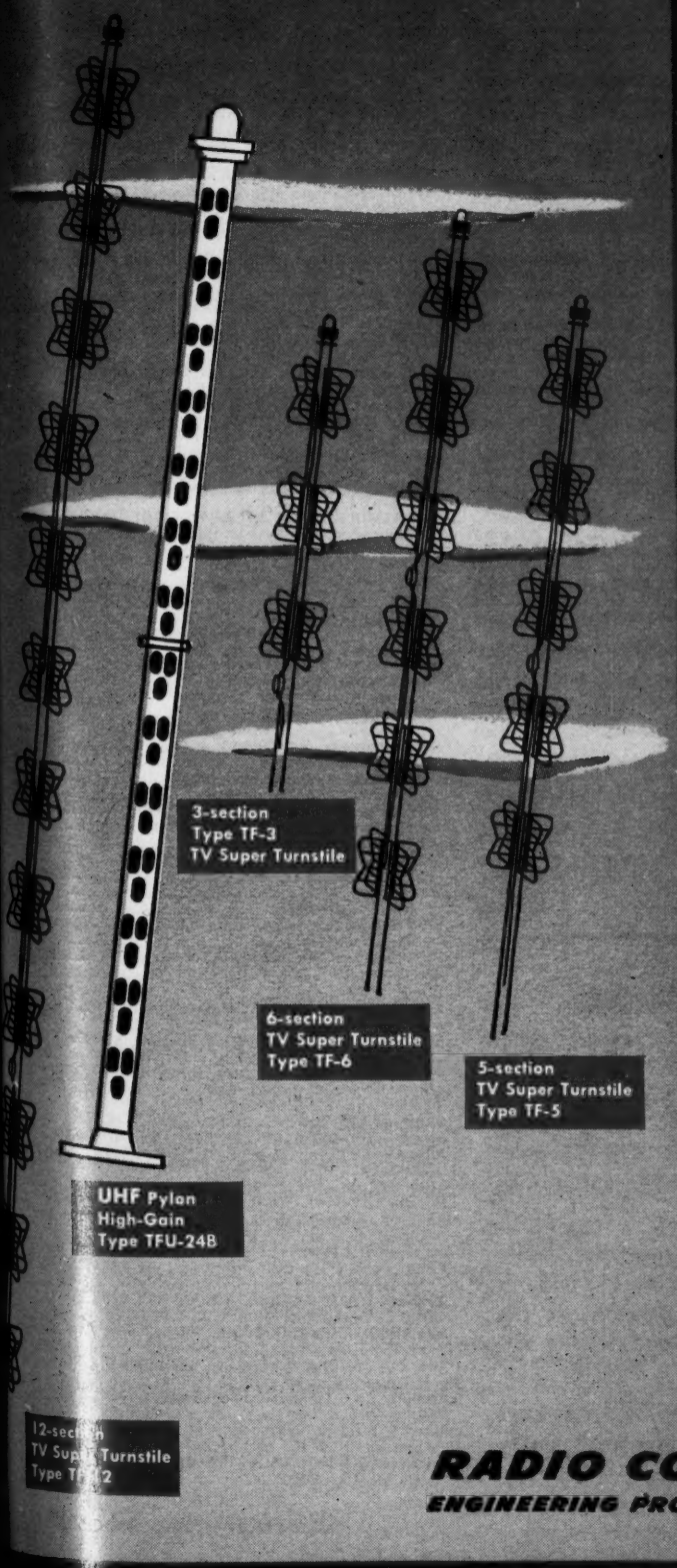
TAKE ONE OF THESE TV TRANSMITTERS...



lower up to 200 KW!*

..ADD ONE OF THESE TV ANTENNAS... = YOUR POWER



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2—Remote Pickup

Antennas ..... **BA**
Auxiliary equipment ..... **BB**
Auxiliary power supplies ..... **BC**
Control consoles ..... **BD**
Crystals ..... **BE**
Micro-wave equipment ..... **BF**
Power supplies ..... **BG**
Transmitters, AM ..... **BH**
Transmitters, FM ..... **BI**
Transmitters, TV ..... **BJ**
Trucks ..... **BK**
Vibration mountings ..... **BL**

Accurate Engineering Co., 2005 Blue Island Ave., Chicago 8, Ill.—BG
Airtron Inc., 101 E. Elizabeth Ave., Linden, N. J.—BF
Alpar Mfg. Co., 466 St. Francis St., Redwood City, Calif.—BA
American Communications Corp., 306 Broadway, New York 7, N. Y.—BB, BC, BD, BG
American Electroneering Co., 5025-19 W. Jefferson Blvd., Los Angeles 16, Calif.—BA, BB, BC, BD, BH
American Television & Radio Co., 300 E. 4th St., St. Paul 1, Minn.—BC
ANDREW CORP., 363 E. 75th St., Chicago 19, Ill.—BA
ARF Products, Inc., 7627 Lake St., River Forest, Ill.—BF
Arlington Electric Products, Inc., 55 Vandam St., New York 13, N. Y.—BB, BD
Automatic Electric Sales, 1033 W. Van Buren St., Chicago 7, Ill.—BF
Rex Bassett, Inc., 311 N.W. 1st Ave., Ft. Lauderdale, Fla.—BE
Beta Electric Corp., 333 E. 103rd St., New York 29, N. Y.—BG
Bliley Electric Co., Union Station Bldg., Erie, Pa.—BE
Breon Laboratories, 1520 Evergreen Rd., Williamsport, Pa.—BE
Brociner Electronics Laboratory, 1546 Second Ave., New York 28, N. Y.—BC
Capehart-Farnsworth Corp., Ft. Wayne 1, Ind.—BF
Carter Motor Co., 2644 N. Maplewood Ave., Chicago 47, Ill.—BG
CGS Laboratories, 391 Ludlow St., Stamford, Conn.—BF, BG
Cinema Engineering Co., 1510 W. Verdugo Ave., Burbank, Calif.—BD
Clear Beam Antennas, 100 Prospect Ave., Burbank, Calif.—BA
Coax Electronics Company, 1524 E. 15th St., Brooklyn 30, N. Y.—BD
Communication Devices Co., 2331 12th Ave., New York 27, N. Y.—BB, BH, BI
Communication Products Co., Marlboro, N. J.—BA
Cornell-Dubilier Electric Corp., Indianapolis Div., 2900 Columbia Ave., Indianapolis, Ind.—BA, BC
Crest Transformer Corp., 1834 W. North Ave., Chicago 22, Ill.—BG
Crystal Research Laboratories, 29 Allyn St., Hartford, Conn.—BE
Dalmo Victor Co., 1414 El Camino Real, San Carlos, Calif.—BA, BF
Dayton Airadio, Inc., P. O. Box 167, Vandalia, Ohio—BG, BJ
Designers for Industry Inc., 2915 Detroit Ave., Cleveland 13, Ohio—BF
Doolittle Radio Inc., 7421 S. Loomis Blvd., Chicago 36, Ill.—BI
Drake, R. L., 11 Longworth St., Dayton 2, Ohio—BA, BB, BC, BG
DuMONT LABORATORIES, INC., ALLEN B., 1000 Main Ave., Clifton, N. J.—BA, BB, BF, BI, BJ, BK
Eidson Electronic Co., 1802 N. Third St., Temple, Texas—BE
Electronic Instrument Co., 276 Newport St., Brooklyn 12, N. Y.—BE
Electronic Research & Mfg. Corp., 1420 E. 25 St., Cleveland 14, Ohio—BB, BI
Electronic Transformer Co., 207 W. 25th St., New York 1, N. Y.—BC
Electro Products Laboratories, 4501 N. Ravenswood Ave., Chicago 40, Ill.—BF, BG
Empire Devices, Inc., 38-25 Bell Blvd., Bayside 61, N. Y.—BF
Engineering Associates, 434 Patterson Road, Dayton 9, Ohio—BF, BG
Equipment and Service Co., 6815 Oriole Drive, Dallas 9, Texas—BB
Erco Radio Labs., Stewart Ave. E., Garden City, L. I., N. Y.—BI
FEDERAL TELECOMMUNICATION LABORATORIES, 500 Washington Ave., Nutley 10, N. J.—BA, BC, BF, BJ
FEDERAL TELEPHONE AND RADIO CORP., 100 Kingsland Road, Clifton, N. J.—BD, BF, BG
Furst Electronics, 12 So. Jefferson St., Chicago 6, Ill.—BG
GATES RADIO CO., Quincy, Ill.—BA, BB, BC, BD, BE, BG, BH, BI
Gaveco Laboratories, 2 East End Ave., New York 21, N. Y.—BC
GENERAL ELECTRIC CO., ELECTRONICS DEPT., Syracuse, N. Y.—BA, BB, BC, BD, BE, BF, BI, BJ, BK
Gulton Mfg. Corp., 212 Durham Ave., Metuchen, N. J.—BE
G. W. Associates, P. O. Box 2263, El Segundo, Calif.—BF
Hamilton Electronics, 2726 Pratt Ave., Chicago 45, Ill.—BD, BG
Hamilton Kent Mfg. Co., Kent, Ohio—BL
Hammarlund Mfg. Co., 460 W. 34th St., New York, N. Y.—BB
Harvey-Wells Electronics, Inc., North St., Southbridge, Mass.—BH, BI
Heyman Mfg. Co., 300 Michigan Ave., Kenilworth, N. J.—BE
Highland Engineering Co., Main & Urban Sts., Westbury, L. I., N. Y.—BG
Hoffman Radio Corp., 6200 S. Avalon Blvd., Los Angeles 6, Calif.—BC, BF, BH, BI
Holub Industries, Inc., Sycamore, Ill.—BB
Hunt Corp., 453 Lincoln St., Carlisle, Pa.—BE
Inductograph Products, Inc., 236 W. 55th St., New York 19, N. Y.—BG
Insuline Corp. of America, 36-02 35th Ave., Long Island City 1, N. Y.—BA
Jamaica Television Mfg. Co., 95-26 Sutphin Blvd., Jamaica 4, L. I., N. Y.—BG, BJ
JAMES KNIGHTS CO., 101 E. Church St., Sandwich, Ill.—BE
Jones Electronics Co., M. C., 96 N. Main St., Bristol, Conn.—BB
Kepco Laboratories, 149-14 41st Ave., Flushing 55, N. Y.—BC, BG
Kings Electronics, Inc., 50 Marbledale Ave., Tuckahoe, N. Y.—BF
Kings Microwave Co., 50 Marbledale Ave., Tuckahoe, N. Y.—BA, BF
Korfund Co., 48-15 32nd Pl., Long Island City 1, N. Y.—BL
LaPointe Plascomold Corp., Windsor Locks, Conn.—BA
Link Radio Corp., 125 W. 17th St., New York, N. Y.—BA, BB, BC, BF, BG, BH, BI
Lord Manufacturing Co., 1635 West 12th St., Erie, Pa.—BL
MB MFG. CO., 1060 State St., New Haven 11, Conn.—BL
Micro Engineering Corp., 15 E. Tujunga Ave., Burbank, Calif.—BF
Microwave Equipment Co., Greenbrook Rd., N. Caldwell, N. J.—BF
Midco Mfg. Co., 607 No. 8th St., Sheboygan, Wisc.—BG
Mid-West Coil & Transformer Co., 1642 N. Halsted St., Chicago 17, Ill.—BG
Millen Mfg. Co., James, 150 Exchange St., Malden 48, Mass.—BG
Modulation Products Co., 56 Lispenard St., New York, N. Y.—BC, BG, BH, BI, BJ
MOTOROLA, INC., 4545 Augusta Blvd., Chicago 51, Ill.—BA, BF, BI
National Electronics Mfg. Corp., 42-08 Vernon Blvd., Long Island City 1, N. Y.—BA, BL
Nebel Laboratory, R. E., 1104 Lincoln Pl., Brooklyn 13 N. Y.—BE
Neptune Electronics Co., 433 Broadway, New York 13 N. Y.—BC, BG
Olesen Co., Otto K., 1534 Cahuenga Blvd., Hollywood 28 Calif.—BD
Onan & Sons, D. W., 3264 University Ave., Minneapolis 14, Minn.—BC
Opad-Green Co., 71 Warren St., New York 7, N. Y.—BG
Parts Producing Corp., Manhattan Div., 1861 Second Ave., New York 28, N. Y.—BI
Peek, Inc., Walter E., 132 E. 44th St., Indianapolis 22, Ind.—BA
Pentron Corp., 221 E. Cullerton St., Chicago 16, Ill.—BG
Philco Corp., Tioga & C Sts., Philadelphia 34, Pa.—BA, BB, BF, BG, BH, BI, BJ
Philson Mfg. Co., 60 Sackett St., Brooklyn 31, N. Y.—BA
Piezo Products Co., Whitney St., Framington, Mass.—BE
POLARAD ELECTRONICS CORP., 100 Metropolitan Ave., Brooklyn 11, N. Y.—BG
Polytechnic Research and Development Co., 202 Tillary St., Brooklyn 1, N. Y.—BF
Precise Development Corp., 999 Longbeach Rd.—BF
Precision Piezo Service, 427 Mayflower St., Baton Rouge, La.—BE
Precision Products, Inc., 719 17 St.N.W., Washington, D. C.—BE
Premax Products Div., Chisholm-Ryder Co., Inc., Highland & College Aves., Niagara Falls, N. Y.—BA
Press Wireless Mfg. Co., Cantiague Rd., Hicksville, N. Y.—BH
Product Development Co., 526 Elm St., Arlington, N. J.—BA, BF
RADIO CORP. OF AMERICA, RCA-VICTOR DIV., Camden, N. J.—BA, BB, BC, BD, BE, BF, BG, BH, BI, BJ, BK
RADIO ENGINEERING LABORATORIES, 36-40 37th St., Long Island City, N. Y.—BA, BF, BI
Radio Specialty Mfg. Co., 2023 S. E. Sixth Ave., Portland, Ore.—BE
Ram Electronics, Inc., S. Buckhout St., Irvington, N. Y.—BC
Raytheon Mfg. Co., Willow St., Waltham, Mass.—BA, BF
Ready-Power Co., 11231 Freud Ave., Detroit 14, Mich.—BC, BG
Reeves-Hoffman Corp., 321 Cherry St., Carlisle, Pa.—BD, BE, BH, BI, BJ
ROBINSON AVIATION, INC., Teterboro Air Terminal, Teterboro, N. J.—BL
Rosen Engineering Products, Raymond, 32nd & Walnut Sts., Philadelphia 4, Pa.—BA, BI
Rowe Industries, 1703 Wayne St., Toledo 9, Ohio—BF
Shrader Mfg. Co., 2803 M Street, N.W., Washington 7, D. C.—BD, BG
Sierra Electronic Corp., 1050 Brittan Ave., San Carlos, Calif.—BB, BG, BH, BI
Silver Co., McMurdo, 417 Lafayette St., New York, N. Y.—BH
Sorensen & Co., 375 Fairfield Ave., Stamford, Conn.—BG
SPERRY GYROSCOPE CO., DIV. OF THE SPERRY CORP., Great Neck, L. I., N. Y.—BF, BG
Standard Electronics Corp., 25 W. 43 St., New York 18, N. Y.—BB, BD, BE
Standard Piezo Co., 127 Cedar St., Carlisle, Pa.—BE
Stephen Mfg. Corp., 8538 Warner Drive, Culver City, Calif.—BG, BI
Tech Laboratories Inc., Bergen & Edsall Blvds., Palisades Park, N. J.—BB
Technical Appliance Corp., Sherburne, N. Y.—BA
TELECHROME, INC., 88 Merrick Rd., Amityville, L. I., N. Y.—BB, BJ
Telectro Industries Corp., 35-16 37th St., Long Island City 1, N. Y.—BF
TELEX, INC., Telex Park, St. Paul 1, Minn.—BA
Thordarson-Meissner Mfg. Div., Maguire Industries, Inc., 500 W. Huron St., Chicago 10, Ill.—BG
Torngren Co., Inc., C. W., 236 Pearl St., Somerville, Mass.—BA
Transmitter Equip. Mfg. Co., 345 Hudson St., New York 14, N. Y.—BD, BH, BI
Trio Mfg. Co., Griggsville, Ill.—BA
U. S. Recording Co., 1121 Vermont Ave., N.W., Washington 5, D. C.—BC, BD, BG
UNIVERSAL AVIATION CORP., 230 Park Ave., New York 17, N. Y.—BD
Ward Products Corp. Div., The Gabriel Corp., 1523 E. 45th St., Cleveland 3, Ohio—BA
Warren Mfg. Co., 250 East St., New Haven, Conn.—BA
Webster Electric Co., Clark & DeKoven Aves., Racine, Wisc.—BE
Willard Storage Battery Co., 246 E. 131st, Cleveland 1, Ohio—BC
Wincharger Corp., E. 7th & Division Sts., Sioux City, Iowa—BA
WORKSHOP ASSOCIATES, DIV. OF THE GABRIEL CO., 135 Crescent Rd., Needham Hghts. 94, Mass.—BA

3—Aviation

Airborne film recorder ..... **DA**
Airborne wire recorder ..... **DB**
Airport controller recorder ..... **DC**
Antennas ..... **DD**
Crystals ..... **DE**
Emergency equipment ..... **DF**
Intercom systems ..... **DG**
Landing system, airborne ..... **DH**
Landing system, ground ..... **DI**
Navigation equipment, airborne ..... **DJ**
Navigation equipment, ground ..... **DK**
Power supplies ..... **DL**
Power supplies, emergency ..... **DM**
Power supplies, 400 CPS ..... **DN**
Radar ..... **DO**
Radio altimeters ..... **DP**
Test equipment ..... **DQ**
Ttransmitters ..... **DS**
Vibration mountings ..... **DR**

Accurate Engineering Co., 2005 Blue Island Ave., Chicago 8, Ill.—DL, DM
Aeronautical Radio Mfg. Co., 155 First St., Mineola, N. Y.—DD, DE, DG, DH, DJ, DL, DN, DP, DR
Air Associates, Inc., Teterboro, N. J.—DJ, DQ
AIRCRAFT RADIO CORP., Boonton, N. J.—DI, DJ, DQ, DS
Airlectron Inc., Box 151, Caldwell, N. J.—DG
Airtron, Inc., 101 E. Elizabeth Ave., Linden, N. J.—DO
Allison Radar Corp., 11 W. 42nd St., New York 18, N. Y.—DJ, DO
Alpar Mfg. Co., 466 St. Francis St., Redwood City, Calif.—DD
American Communications Corp., 306 Broadway, New York, N. Y.—DF, DG, DL, DM, DN
American Electroneering Co., 5025-19 W. Jefferson Blvd., Los Angeles 16, Calif.—DF, DH, DI, DJ, DL, DM, DO, DP, DQ
American Hydromath Corp., 145 W. 57th St., New York 19, N. Y.—DJ, DK
AMERICAN PHENOLIC CORP., 1830 S. 54th Ave., Chicago 50, Ill.—DD
American Television & Radio Co., 300 E. 4th St., St. Paul 1, Minn.—DL, DM
Amplifier Corp. of America, 398 Broadway, New York 12, N. Y.—DC
Antenna Research Laboratory, Inc., 797 Thomas Lane, Columbus 14, Ohio—DD, DJ, DQ
Associated Research Inc., 3758 W. Belmont Ave., Chicago 18, Ill.—DQ

FM Production Jan-June, '51

The half-year radio total included 4,212,222 home sets, 845,309 portables and 2,969,632 automobile radios.

Radios with FM reception facilities were estimated at 693,038, or approximately 17 percent of the home radios produced in the six-month period.

In addition, 240,552 TV receivers with FM audio circuits were manufactured.

Barry Corp., 700 Pleasant St., Watertown 72, Mass.—DR
Bassett Inc., Rex, 311 N.W. First Ave., Ft. Lauderdale, Fla.—DE, DQ
Bell Sound Systems, 555 Marion Road, Columbus 7, Ohio—DG
BENDIX AVIATION CORP., ECLIPSE-PIONEER DIV., Teterboro, N. J.—DH, DJ, DL, DM, DN
Bendix Aviation Corp., Red Bank Div., Red Bank, N. J.—DL
Bendix Aviation Corp., Pacific Div., 11600 Sherman Way, N. Hollywood, Calif.—DJ, DK, DO
BENDIX RADIO DIV., BENDIX AVIATION CORP., Baltimore 4, Md.—DD, DG, DH, DI, DJ, DK, DL, DO, DP, DQ
Berkeley Scientific Corp., 2200 Wright Ave., Richmond, Calif.—DQ
BERNDT-BACH, INC., AURICON DIV., 7325 Beverly Blvd., Los Angeles 36, Calif.—DA, DL
Beta Electric Corp., 333 E. 103rd St., New York 29, N. Y.—DL
Biddle Co., James G., 1316 Arch St., Philadelphia 7, Pa.—DQ
Bliley Electric Co., Union Station Bldg., Erie, Pa.—DE
Bliss-Warren Electronic Corp., Sussex Airport, Sussex, N. J.—DQ
Boehme, Inc., H. O., 915 Broadway, New York 10, N. Y.—DK
Boonton Radio Corp., Intervale Road, N. J.—DQ
Breon Laboratories, 1520 Evergreen Rd., Williamsport, Pa.—DE
Brociner Electronics Laboratory, 1546 Second Ave., New York 28, N. Y.—DG, DQ
Brush Development Co., 3405 Perkins Ave., Cleveland 14, Ohio—DB, DC
Bunnell & Co., J. H., 881 Prospect St., Brooklyn 1, N. Y.—DI, DK, DL, DM, DO, DP
Burnett Radio Laboratory, Wm. W. L., 4814 Idaho St., San Diego 16, Calif.—DE
Carter Motor Co., 2644 N. Maplewood Ave., Chicago 47, Ill.—DN
Clear Beam Antennas, 100 Prospect Ave., Burbank, Calif.—DD
Coil Winders, Inc., 61 Bergen St., Brooklyn 2, N. Y.—DL, DM, DQ
Collins Radio Co., Cedar Rapids, Iowa—DD, DE, DH, DJ, DL, DN, DQ
Commercial Radio Equipment Co., Int'l. Bldg., Washington, D. C.—DE
Communication Devices Co., 2331 12th Ave., New York 27, N. Y.—DJ, DK, DL, DM, DO, DP
Connecticut Telephone & Electric Corp., 70 Britannia St., Meriden, Conn.—DG
Consolidated Engineering Corp., 300 N. Sierra Madre Villa, Pasadena 8, Calif.—DQ
Cornell-Dubilier Electric Corp., 333 Hamilton Blvd., South Plainfield, N. J.—DL
Crest Transformer Corp., 1834 W. North Ave., Chicago 22, Ill.—DL, DM
Crystal Research Laboratories, 29 Allyn St., Hartford, Conn.—DE
Daco Machine & Tool Co., 202 Tillary St., Brooklyn 1, N. Y.—DJ
Dallons Laboratories, 5066 Santa Monica Blvd., Los Angeles 27, Calif.—DE
Dalmo—Victor Co., 1414 El Camino Real, San Carlos, Calif.—DD, DG, DH, DI, DJ, DO
Daystrom Electronic Corp., 837 Main St., Poughkeepsie, N. Y.—DB, DC
Dayton Airadio, Inc., P. O. Box 167, Vandalia, Ohio—DD, DG, DL
Delco Radio Division, Kokomo, Indiana—DG, DH, DJ, DO, DP
Designers for Industry, Inc., 2915 Detroit Ave., Cleveland 13, Ohio—DG, DO, DQ
Dictaphone Corp., 420 Lexington Ave., New York 17, N. Y.—DC
Drake Co., R. L., 11 Longworth St., Dayton 2, Ohio—DA DB, DD, DL, DM, DN, DQ
Edin Co., 207 Main St., Worcester 8, Mass.—DG, DQ
Eicor, Inc., 1501 W. Congress St., Chicago 7, Ill.—DL, DM, DN
Eidson Electronic Co., 1802 N. Third St., Temple, Texas—DE
Electronic Instrument Co., 276 Newport St., Brooklyn 12, N. Y.—DE
Electronic Measurements Co., Red Bank, N. J.—DN
Electronics Research, Inc., P. O. Box 327, Evansville, Ind.—DD
Electro Products Laboratories, 4501 N. Ravenswood Ave., Chicago 40, Ill.—DL, DM, DQ
Elm Laboratories, 18 S. Broadway, Dobbs Ferry, N. Y.—DG
Engineering Associates, 434 Patterson Rd., Dayton 9, Ohio—DQ
Erco Radio Laboratories, Stewart Ave., E. Garden City, L. I., N. Y.—DI, DL
Executone Inc., 415 Lexington Ave., New York 17, N. Y.—DG
FEDERAL TELEPHONE & RADIO CORP., 100 Kingsland Rd., Clifton, N. J.—DG, DH, DI, DK, DL
Fischer & Porter Co., 19 County Line Road, Hatboro, Pa.—DQ
Flock Process Co., 31 Fahey St., Springdale, Conn.—DR
Gadgets, Inc., 3629 N. Dixie Drive, Dayton 4, Ohio—DD, DO, DQ
Gaveco Laboratories, 2 East End Ave., New York 21, N. Y.—DL, DM
GENERAL ELECTRIC CO., ELECTRONICS DEPT., Syracuse, N. Y.—DD, DE, DH, DI, DJ, DK, DL, DM, DO
Gilfillan Bros., 1815 Venice Blvd., Los Angeles 6, Calif.—DH, DI, DJ, DK, DO
Gulton Mfg. Corp., 212 Durham Ave., Metuchen, N. J.—DE, DQ
G. W. Associates, P. O. Box 2263, El Segundo, Calif.—DL, DQ
Hamilton Electronics, 2726 Pratt Ave., Chicago 45, Ill.—DG, DL, DM

Rectangular TV Tubes Now 96%

Ninety-six percent of all television picture tubes sold to receiver manufacturers in recent months have been rectangular in form.

Receiver manufacturers' picture-tube purchases during the first half of this year totaled 2,800,000 tubes at $75,000,000.

Hamilton-Kent Mfg. Co., Kent, Ohio—DR
Harvey Radio Laboratories, 447 Concord Ave., Cambridge 38, Mass.—DD
Harvey-Wells Electronics, Inc., North Street, Southbridge, Mass.—DJ, DK, DL, DP
Hastings Instrument Co., Super Highway & Pine Ave., Hampton, Va.—DH, DI, DJ, DK, DL, DN
Heyman Mfg. Co., 300 Michigan Ave., Kenilworth, N. J.—DE
Highland Engineering Co., Main & Urban Sts., Westbury, N. Y.
Holub Industries, Inc., Sycamore, Ill.—DJ, DK, DL
HOUSTON-FEARLESS CORP., 11801 W. Olympic Blvd., Los Angeles 64, Calif.—DO
Hunt Corp., 453 Lincoln St., Carlisle, Pa.—DE
HUGHES AIRCRAFT CO., Culver City, Calif.—DD, DJ, DO
Inductograph Products, Inc., 236 W. 55th St., New York 19, N.Y.—DL, DM, DN
JAMES KNIGHTS CO., Sandwich, Ill.—DE
Joy Mfg. Co., Oliver Bldg., Pittsburgh 2, Pa.—DH, DI
Kay Electric Co., Maple Ave., Pine Brook, N. J.—DQ
Kepco Laboratories, 149-14 41st Ave., Flushing 55, N. Y.—DL, DM, DN, DQ
Kings Microwave Co., 50 Marbledale Rd., Tuckahoe, N. Y.—DD, DQ
Korfund Co., 48-15 32nd Pl., Long Island City 1, N. Y.—DR
Laboratory for Electronics, 43 Leon St., Boston, Mass.—DH, DI, DJ, DK, DO, DQ
Lake Mfg. Co., 2323 Chestnut St., Oakland 7, Calif.—DG
LaPointe Plascomold Corp., Windsor Locks, Conn.—DD
Lavoie Laboratories Inc., Matawan-Freehold Rd., Morganville, N. J.—DK, DO
Lear Inc., 11916 W. Pico Bldg., Los Angeles 64, Calif.—DG, DJ, DQ, DS
Leru Laboratories, 360 Bleecker St., New York 14, N. Y.—DO
Lingo & Son, John E., 2814 Buren Ave., Camden 5, N. J.—DD
Link Aviation, Binghamton, N. Y.—DI, DK
Lionel Corp., Irvington, N. J.—DG, DJ, DK, DM, DN, DO
Loral Electronics Corp., 794 E. 140th St., Bronx 54, N. Y.—DJ
Lord Mfg. Co., 1635 W. 12th St., Erie, Pa.—DR
McColpin-Christie Corp., 3410 W. 67th St., Los Angeles 43, Calif.—DL
Marconi Instruments, 23 Beaver St., New York, N. Y.—DQ
Maryland Electronic Mfg. Corp., 5009 Calvert Rd., College Park, Md.—DI, DK
Maurer, Inc., J. A., 37-01 31st St., Long Island City 1, —DA
MB Mfg. Co., 1060 State St., New Haven 11, Conn.—DQ, DR
MELPAR, INC., 452 Swann Ave., Alexandria, Va.—DD, DJ, DK
Metal Textile Corp., 647 E. 1st Ave., Middlesex, N. J.—DR
Microwave Equipment Co., Greenbrook Rd., N. Caldwell, N. J.
Midco Mfg. Co., 607 N. 8th St., Sheboygan, Wisc.—DL
Mid-West Coil & Transformer Co., 1642 N. Halsted St., Chicago 17, Ill.—DL
Millen Mfg. Co., James, 150 Exchange St., Malden 48, Mass.—DQ
Miller Laboratories, August E., 9226 Hudson Blvd., N. Bergen, N. J.—DE
Mitchell Industries, Mineral Wells, Texas—DD, DJ, DS
Modulation Products Co., 56 Lispenard St., New York, N. Y.—DL, DM, DS
Monitor Products Co., 815 Fremont Ave., S. Pasadena, Calif.—DE
Motoresearch Co., 1600 Junction Ave., Racine, Wisc.—DN
National Aeronautical Corp., 180 S. Main St., Ambler, Pa.—DD, DJ, DL, DQ
National Electronics Mfg. Corp., 42-08 Vernon Blvd., Long Island City 1, N. Y.—DD, DE, DR
Nebel Laboratory, R. E., 1104 Lincoln Place, Brooklyn 13, N. Y.—DE
Neptune Electronics Co., 433 Broadway, New York 13, N. Y.—DG, DJ, DL, DN
Network Mfg. Corp., 213 W. 5th St., Bayonne, N. J.—DD, DL, DP, DQ
Nichols Products Co., 325 W. Main St., Moorestown, N. J.—DO
Northern Zaleski, Ltd., Pratt Oval, Glen Cove, L. I., N. Y.—DQ
O'Brien Electric Co., 5326 Sunset Blvd., Hollywood 27, Calif.—DG
Olesen Co., Otto K., 1534 Cahuenga Blvd., Hollywood 28, Calif.—DG
Onan & Sons, D. W., 43 Royalston Ave. N., Minneapolis, Minn.—DM, DN
Opad-Green Co., 71 Warren St., New York 7, N. Y.—DL
Peerless Products Industries, 812 N. Pulaski Rd., Chicago 51, Ill.—DD
Peirce Wire Recorder Corp., 1328 Sherman, Evanston, Ill.—DB
Pentron Corp., The, 221 E. Cullerton St., Chicago 16, Ill.—DB, DG, DL
Perma-Power Co., 4721 N. Damen Ave., Chicago 25, Ill.—DL
Philco Corp., Tioga & C. Sts., Philadelphia 34, Pa.—DJ, DO, DS
Philson Mfg. Co., 60 Sackett St., Brooklyn 31, N. Y.—DD
Piezo Products Co., Whitney St., Framingham, Mass.—DE
POLARAD ELECTRONICS CORP., 100 Metropolitan Ave., Brooklyn 11, N. Y.—DQ
Potter Instrument Co., 115 Cutter Mill Rd., Great Neck, L. I., N. Y.—DQ
Precision Piezo Service, 427 Mayflower St., Baton Rouge, La.—DE
Precision Products, Inc., 719 17th St., N.W., Washington, D. C.—DE, DJ, DK
Premax Products Div., Chisholm-Ryder Co., Inc., Highland & College Aves., Niagara Falls, N. Y.—DD
Radiomarine Corp. of America, 75 Varick St., New York, 13, N. Y.—DO
Radio-Music Corp., 84 S. Water St., Port Chester, N. Y.—DD
Radio Specialty Mfg. Co., 2023 S. E. Sixth Ave., Portland 14, Ore.—DE
Radio Transceiver Laboratories, 116-23 Jamaica Ave., Richmond Hill 18, N. Y.—DS
Ready-Power Co., 11231 Freud Ave., Detroit 14, Mich.—DL, DM
Reeves-Hoffman Corp., 321 Cherry St., Carlisle, Pa.—DE
Reiner Electronics Co., 152 W. 25th St., New York 1, N. Y.—DL
ROBINSON AVIATION, INC., Teterboro Air Terminal, Teterboro, N. J.—DR
Rowe Industries, 1702 Wayne St., Toledo 9, Ohio—DA, DD, DG, DL, DQ
SARKES TARZIAN, INC. (see Tarzian, Inc., Sarkes)
Schuttig & Co., 9th & Kearny Sts., N.E., Washington 17, D. C.—DD, DH, DJ, DK, DL, DP, DS
Scientific Radio Products Co., 738 W. Broadway, Council Bluffs, Iowa—DE
Scientific Radio Service, 4301 Sheridan St., Hyattsville, Md.—DE
Servomechanisms, Inc., Post & Stewart Aves., Westbury, N. Y.—DJ, DN
Sierra Electronic Corp., 1050 Brittan Ave., San Carlos, Calif.—DI, DK, DL, DN, DQ
Simplophone Corp. of America, 303 Fifth Ave., New York 16, N. Y.—DG
SIMPSON ELECTRIC CO., 5208 W. Kinzie St., Chicago 44, Ill.—DQ
Sorensen & Co., 375 Fairfield Ave., Stamford, Conn.—DL, DN
SPERRY GYROSCOPE CO., DIV. OF THE SPERRY CORP., Great Neck, N. Y.—DI, DJ, DK, DO, DQ
Stancil-Hoffman Corp., 1016 N. Highland Ave., Hollywood 38, Calif.—DB, DC
Standard Electrical Products, 400 E. First St., Dayton 2, Ohio—DG, DL, DN
Standard Piezo Co., 127 Cedar St., Carlisle, Pa.—DE
Star Expansion Products Co., 147 Cedar St., New York 6, N. Y.—DQ
Sterling Instruments Co., 13331 Linwood Ave., Detroit 6, Mich.—DQ, DR
Stromberg-Carlson Co., 100 Carlson Rd., Rochester, N. Y.—DG
Suburban Radio Co., 158 Central Ave., Rochelle Park, N. J.—DL, DM, DS
Tartak-Stolle Electronics, Inc., 3970 S. Grand Ave., Los Angeles 37, Calif.—DN
TARZIAN, INC., SARKES, 539 S. Walnut St., Bloomington, Ind.—DF, DJ, DK, DL, DO
Tech Laboratories, Inc., Bergen & Edsall Blvds., Palisades Park, N. J.—DQ
TELECHROME, INC., 88 Merrick Rd., Amityville, L. I., N. Y.—DQ
Telectro Industries Corp., 35-16 37th St., Long Island City 1., N. Y.—DG, DQ
Tel-Instrument Co., 50 Paterson Ave., E. Rutherford, N. J.—DL
Thordarson-Meissner Mfg. Div., Maguire Industries, Inc., 500 W. Huron St., Chicago 10, Ill.—DL, DM
Torngren Co., Inc., C. W., 236 Pearl St., Somerville, Mass.—DD
Transmitter Equip. Mfg. Co., 345 Hudson St., New York 14, N. Y.—DG, DJ, DK, DL, DO, DQ
U. S. Motors Corp., 584 Nebraska St., Oshkosh, Wisc.—DM
Valpey Crystal Corp., P. O. Box 325, Holliston, Mass.—DE
Varo Mfg. Co., Box 638, Garland, Tex.—DL, DM
Vokar Corp., 7300 Huron River Drive, Dexter, Mich.—DL, DM
Walkirt Co., 5808 Marilyn Ave., Culver City, Calif.—DQ
Ward Products Corp., Div. Gabriel Corp., 1523 E. 45th St., Cleveland 3, Ohio—DD
Warren Mfg. Co., 250 East St., New Haven, Conn.—DD
Western Sound & Electric Labs., 805 S. Fifth St., Milwaukee, Wisc.—DG
Westline Electronics Co., 11660 Olympic Blvd., Los Angeles 25, Calif.—DE
Weston Electrical Instrument Corp., 614 Frelinghuysen Ave., Newark 5, N. J.—DQ

WHEELER INSULATED WIRE CO., 150 E. Aurora St., Waterbury 20, Conn.—DG
Wilcox Electric Co., 14th & Chestnut Sts., Kansas City, Mo.—DE, DF, DG, DL, DM, DN, DQ, DS
Wincharger Corp., E. 7th & Division Sts., Sioux City, Iowa—DL, DM, DN
WIND TURBINE CO., E. Market St. & P. R. R., W. Chester, Pa.—DD
Winslow Co., 9 Liberty St., Newark 5, N. J.—DG, DJ
WORKSHOP ASSOCIATES, DIV. OF THE GABRIEL CO., 135 Cresecent Rd., Needham Hts. 94, Mass.—DD

4—Police, Industrial, Common Carrier, Marine, Railroad, Public Safety, Civilian Defense, etc.

Antennas ..... **CA**
Auto alarms ..... **CB**
Citizen radios ..... **CC**
Control equipment ..... **CD**
Crystals ..... **CE**
Film Recorders ..... **CR**
Intercom systems ..... **CF**
Microphones ..... **CG**
Pack sets ..... **CH**
Portable Field Telephone ..... **CS**
Power supplies ..... **CI**
Power supplies, emergency ..... **CJ**
Radar ..... **CW**
Receivers, fixed ..... **CK**
Receivers, mobile ..... **CL**
Transceivers ..... **CM**
Transmitters ..... **CN**
Vibration mountings ..... **CO**
Walkie Talkies ..... **CP**

Accurate Engineering Co., 2005 Blue Island Ave., Chicago 8, Ill.—CI, CJ
Aeronautical Communications Equip., 3090 Douglas Rd., Miami 33, Fla.—CK, CL, CN
Air Associates, Inc., Teterboro, N. J.—CA, CB, CD, CF, CH, CI, CK, CL, CM, CN, CP, CQ
Airplane & Marine Instruments, Inc., Clearfield, Pa.—CI, CM, CN
Alpar Mfg. Co., 466 St. Francis St., Redwood City, Calif.—CA
ALTEC LANSING CORP., 9356 Santa Monica Blvd., Beverly Hills, Calif.—CG, CI
American Communications Corp., 306 Broadway, New York, N. Y.—CC, CD, CF, CH, CI, CJ, CK, CL, CM, CN, CP
American Electroneering Co., 5025-19 W. Jefferson Blvd., Los Angeles 16, Calif.—CD, CH, CI, CJ, CK, CL, CM
American Microphone Co., 370 S. Fair Oaks Ave., Pasadena, Calif.—CF
AMERICAN PHENOLIC CORP., 1830 S. 54th Ave., Chicago 50, Ill.—CA
American Television & Radio Co., 300 E. 4th St., St. Paul 1, Minn.—CI, CJ
ANDREW CORP., 363 E. 75th St., Chicago 19, Ill.—CA
Antenna Research Laboratory, Inc., 797 Thomas Lane, Columbus 14, Ohio—CA
Applied Electronics Co., 1246 Folsom St., San Francisco 3, Calif.—CA, CK, CN
Approved Electronic Instrument Corp., 142 Liberty St., New York 6, N. Y.—CK
Arlington Electric Products Inc., 55 Vandam St., New York 13, N. Y.—CD, CF, CK
Astatic Corp., Harbor and Jackson Sts., Conneaut, Ohio—CG
Automatic Electric Sales, 1033 W. Van Buren St., Chicago 7, Ill.—CF, CK, CL
Barry Corp., 700 Pleasant, Watertown, Mass.—CO
Barker & Williamson, Inc., 235 Fairfield Ave., Upper Darby, Pa.—CD, CH, CK, CL, CM
Bassett, Inc., Rex, 311 N.Y. 1st Ave., Ft. Lauderdale, Fla.—CE, CK, CL, CM, CN
Bell Sound Systems, 555 Marion Road, Columbus 7, Ohio—CF
Bendix Aviation Corp., Red Bank Div., Red Bank, N. J.—CI
BENDIX RADIO DIV., BENDIX AVIATION CORP., Baltimore 4, Md.—CA, CD, CH, CI, CK, CL, CM, CN, CP
Beta Electric Corp., 333 E. 103rd St., New York 29, N. Y.—CI
Bliley Electric Co., Union Station Bldg., Erie, Pa.—CE
Bliss-Warren Electronic Corp., Sussex Airport, Sussex, N. J.—CD
Boehme, Inc., H. O., 915 Broadway, New York 10, N. Y.—CD
Brelco Electronics Corp., 55 Vandam St., New York 13, N. Y.—CB, CK, CL
Breon Laboratories, 1520 Evergreen Rd., Williamsport, Pa.—CE
Brociner Electronics Laboratory, 1546 Second Ave., New York 28, N. Y.—CD, CF, CI
Browning Laboratories, Inc., 750 Main St., Winchester, Mass.—CD
Brush Development Co., 3405 Perkins Ave., Cleveland 14, Ohio—CG
Buggie & Co., H. H., 726 Staton St., Toledo, Ohio—CA
Bunnell & Co., J. H., 81 Prospect St., Brooklyn 1, N. Y. CD, CI, CJ, CK, CL, CM
Burnett Radio Laboratory, Wm. W. L., 4814 Idaho St., San Diego 16, Calif.—CE
Burton-Rogers Co., 292 Main St., Cambridge 42, Mass.—CA
Capehort-Farnsworth Corp., Ft. Wayne 1, Ind.—CA, CI, CL, CN
Carter Motor Co., 2644 N. Maplewood Ave., Chicago 47, Ill.—CI
Cinema Engineering Co., 1510 W. Verdugo Ave., Burbank, Calif.—CI
Clarke Instrument Corp., 919 Jesup-Blair Dr., Silver Spring, Md.—CK
Clear Beam Antennas, 100 Prospect Ave., Burbank, Calif.—CA
Coil Winders, Inc., 61 Bergen St., Brooklyn 2, N. Y.—CI
Collins Audio Products Co., P. O. Box 368, Westfield, N. J.—CK, CL
Collins Radio Co., Cedar Rapids, Iowa—CD, CE, CK, CN
Commercial Radio Equipment Co., International Bldg., Washington, D. C.—CE
Communications Co., 300 Greco Ave., Coral Gables, Fla.—CA, CI, CK, CL
Communication Devices Co., 2331 12th Ave., New York 27, N. Y.—CB, CF, CH, CI, CJ, CK, CL, CM, CN, CP
Communication Measurements Laboratory, Inc., 120 Greenwich St., New York 6, N. Y.—CI
Communication Products Co., Marlboro, N. J.—CA
Connecticut Telephone & Electric Corp., 70 Britannia St., Meriden, Conn.—CF, CG
Cooper Electronic Products Co., 4500 Melrose St., Philadelphia, Pa.—CF
Cornell-Dubilier Electric Corp., 333 Hamilton Blvd., S. Plainfield, N. J.—CI, CJ
Crest Transformer Corp., 1834 W. North Ave., Chicago 22, Ill.—CI, CJ
Crystal Research Laboratories, 29 Allyn St., Hartford, Conn.—CE
Custom Craft Mfg. Co., 256 E. 98th St., Brooklyn 12, N. Y.—CD, CN
Dalmo-Victor Co., 1414 El Camino Real, San Carlos, Calif.—CF
Daystrom Electronic Corp., 837 Main St., Poughkeepsie, N. Y.—CR
Delco Radio Division, Kokomo, Ind.—CK, CL, CM, CP
Designers for Industry Inc., 2915 Detroit Ave., Cleveland 13, Ohio—CD, CF, CK, CL, CP
Dielectric Products Co., 125 Virginia Ave., Jersey City 5, N. J.—CA
Doolittle Radio, Inc., 7421 Loomis Blvd., Chicago 36, Ill.—CH, CP
Drake Co., R. L., 11 Longworth St., Dayton 2, Ohio—CA, CI, CJ, CK, CL
DuKane Corp., St. Charles, Ill.—CF
Eckstein Radio & Television Co., 3400 East 42nd St., Minneapolis, Minn.—CL
Edin Co., 207 Main St., Worcester 8, Mass.—CC, CF, CP
Eicor, Inc., 1501 W. Congress St., Chicago 7, Ill.—CI, CJ
Eidson Electronic Co., 1802 N. Third St., Temple, Texas—CE
Electric Specialty Co., 211 South St., Stamford, Conn.—CI
Electronic Instrument Co., 276 Newport St., Brooklyn 12, N. Y.—CE
Electronic Rectifiers, Inc., 2102 Spaan Ave., Indianapolis 3, Ind.—CI, CJ
Electronic Research & Mfg. Corp., 1420 E. 25th St., Cleveland 14, Ohio—CC, CD, CF, CH, CK, CL, CN, CP
Electronics Contracting Co., 122 Chambers St., New York 7, N. Y.—CM
Electronics Research, Inc., P. O. Box 327, Evansville, Ind.—CA
Electro Products Laboratories, 4501 N. Ravenswood Ave., Chicago 40, Ill.—CI, CJ
Electro-Voice, Inc., Carroll & Cecil Sts., Buchanan, Mich.—CG
Elm Laboratories, 18 S. Broadway, Dobbs Ferry, N. Y.—CF, CK
Eltron, Inc., 407 N. Jackson St., Jackson, Mich.—CD, CI
Erco Radio Laboratories, Stewart Ave. E., Garden City, L. I., N. Y.—CA, CD, CI, CK, CL, CN
Executone, Inc., 415 Lexington Ave., New York, N. Y.—CF
Farmers Eng'g. & Mfg. Co., 549 Brushton Ave., Pittsburgh 21, Pa.—CD, CF, CM
FEDERAL TELEPHONE AND RADIO CORP., 100 Kingsland Rd., Clifton, N. J.—CA, CD, CF, CI, CK, CL, CM, CN
Ferrar Radio & Television Corp., 55 W. 26th St., New York 10, N. Y.—CF, CI, CK, CL
Fisher Research Labs., 1961 University Ave., Palo Alto, Calif.—CK, CL, CM, CN, CP
Flock Process Co., 31 Fahey St., Springdale, Conn.—CO
Gale-Dorothea Mechanisms, 81-01 Broadway, Elmhurst, L. I., N. Y.—CD
GATES RADIO CO., Quincy, Ill.—CE, CI, CJ, CK, CN
Gaveco Laboratories, 2 East End Ave., New York 21, N. Y.—CD, CI, CJ
Gee-Lar Mfg. Co., 1330 10th Ave., Rockford, Ill.—CA, CD
GENERAL ELECTRIC CO., ELECTRONICS DEPT., Syracuse, N. Y.—CA, CD, CE, CF, CI, CJ, CK, CL, CM, CN
Gertsch Products, Inc., 118-46 Mississippi Ave., Los Angeles 25, Calif.—CL
Godfrey Mfg. Co., 171 S. 2nd St., Milwaukee 4, Wisc.—CF
Gray Radio Co., 501 Forest Hill Blvd., W. Palm Beach, Fla.—CM
Gulton Mfg. Corp., 212 Durham Ave., Metuchen, N. J.—CE, CG
G. W. Associates, P. O. Box 2263, El Segundo, Calif.—CA, CI
Hallicrafters Co., 4401 W. Fifth Ave., Chicago 24, Ill.—CK, CL
Hamilton Electronics, 2726 Pratt Ave., Chicago 45, Ill.—CD, CF, CI, CJ
Hamilton Kent Mfg. Co., Kent, Ohio—CO
Hammarlund Mfg. Co., 460 W 34th St., New York 1, N. Y.—CD
Harvey Radio Laboratories, 447 Concord Ave., Cambridge 38, Mass.—CA, CD, CE, CI, CK, CL, CM, CN
Harvey-Wells Electronics, Inc., North Street, Southbridge, Mass.—CC, CH, CI, CJ, CK, CL, CM, CN, CP
Hastings Instrument Co., Super Highway & Pine Ave., Hampton, Va.—CD
Heyman Mfg. Co., 300 Michigan Ave., Kenilworth, N. J.—CE
Highland Engineering Co., Main & Urban Sts., Westbury, L. I., N. Y.—CI
Holtzer-Cabot, 125 Amory St., Boston 19, Mass.—CS
Holub Industries, Inc., Sycamore, Ill.—CI
Hudson American Corp., 25 W. 43rd St., New York 36, N. Y.—CA, CE, CL, CM, CN
Hunt Corp., 453 Lincoln St., Carlisle, Pa.—CE
Inductograph Products, Inc., 236 W. 55th St., New York 19, N. Y.—CI, CJ
Insuline Corp. of America, 36-02 35th Ave., Long Island City 1, N. Y.—CA
Intercall Systems, Inc., 10 Norwood Ave., Dayton 1, Ohio—CF
Intervox Corp., 1846 Westlake N., Seattle 9, Wash.—CA, CF, CM, CN
Ionic Electronic Equipment Co., 1705 N. Kenmore, Los Angeles 27, Calif.—CD
Jamaica Television Mfg. Co., 95-26 Sutphin Blvd., Jamaica 4, L. I., N. Y.—CA, CK, CM, CN
JAMES KNIGHTS CO., Sandwich, Ill.—CE
Jefferson Inc., Ray, 40 E. Merrick Rd., Freeport, L. I., N. Y.—CA, CE, CL, CM, CN
JOHNSON CO., E. F., 206 2nd Ave., S.W., Waseca, Minn.—CN
Kaar Engineering Co., 2995 Middlefield Rd., Palo Alto, Calif.—CA, CD, CE, CG, CI, CK, CL, CM, CN
Kepco Laboratories, Inc., 149-14 41st Ave., Flushing 55, N. Y.—CD, CI, CJ
Kings Microwave Co., 50 Marbledale Rd., Tuckahoe, N. Y.—CA
Korfund Co., 48-15 32 Pl., Long Island City 1, N. Y.—CO
Lake Mfg. Co., 2323 Chestnut St., Oakland 7, Calif.—CF
Laurehk Radio Mfg. Co., 3927 Monroe Ave., Wayne, Mich.—CK, CL
LINDBERG INSTRUMENT CO., 830 Folger Ave., Berkeley, Calif.—CG
Lingo & Son Inc., John E., 2814 Buren Ave., Camden 5, N. J.—CA
Link Radio Corp., 125 W. 17th St., New York, N. Y.—CA, CB, CD, CE, CF, CH, CI, CJ, CK, CL, CM, CN, CP
Lionel Corp., Irvington, N. J.—CD, CF, CG, CH, CM
Lord Mfg. Co., 1635 W. 12th St., Erie, Pa.—CO
Lumenite Electronic Co., 407 S. Dearborn St., Chicago 5, Ill.—CB, CD
Lyman Electronic Corp., 12 Cass St., Springfield 4, Mass.—CF

Management Queries

The Purdue University Research Foundation has copyrighted a test to facilitate choosing supervisors for promotion. It is a carefully devised and scored examination of human-relations attitudes, which many large companies are using in filling managerial jobs. Here are, some examples of the questions asked:

Which of the following practices and statements do you think are right, which are wrong:

(1) Admitting it to your workers when you make a wrong decision.

(2) Explaining the company's policies concerning hiring, firing, and promoting men.

(3) Using production records alone to determine which worker to recommend for promotion.

(4) Posting the names of the workers with the worst production records during each previous week.

(5) Most employees do better work if they get a good bawling out every so often.

(6) The best way to handle tough workers is to be tougher than they are.

(7) Most employees will do better work when constantly watched by their supervisors.

216 Million Tubes Sold First Half of 1951

Sales of receiving tubes in the first half of 1951 totalled 215,902,-325 units compared with 170,375,-921 tubes sold in the corresponding period of 1950, according to the Radio-Television Manufacturers Association.

The RTMA report showed 153,-957,766 tubes sold for new equipment, 50,105,634 for replacements, 10,358,858 for export and 1,480,067 tubes sold to Government agencies during the six-month period. Sales during the month of June amounted to 27,667,099 tubes compared with 32,480,668 in the corresponding month of 1950.

Lysco Mfg. Co., 82 Herman St., East Rutherford, N. J.—CK, CL, CN, CP
McColpin-Christie Corp., 3410 W. 67th St., Los Angeles 43, Calif.—CI
Maurer, Inc., J. A., 37-01 31st St., Long Island City 1, N. Y.—CI
MB Mfg. Co., 1060 State St., New Haven 11, Conn.—CO
Metal Textile Corp., 647 E. 1st Ave., Middlesex, N. J.—CO
Midco Mfg. Co., Inc., 607 No. 8th St., Sheboygan, Wisc.—CI, CJ
Mid-West Coil & Transformer Co., 1642 N. Halsted St., Chicago 17, Ill.—CF
Millen Mfg. Co., Inc., James, 150 Exchange St., Malden 48, Mass.—CI
Miller Laboratories, August E., 9226 Hudson Blvd., North Bergen, N. J.—CE
Mitchell Industries, Mineral Wells, Texas—CL, CM
Modulation Products Co., 56 Lispenard St., New York 13, N. Y.—CD, CF, CH, CI, CJ, CK, CL, CM, CN, CP
Monitor Products Co., 815 Fremont Ave., S. Pasadena, Calif.—CE
MOTOROLA, INC., 4545 Augusta Blvd., Chicago 51, Ill.—CA, CB, CD, CE, CF, CH, CI, CJ, CK, CL, CM, CN, CP
National Aeronautical Corp., 180 S. Main St., Ambler, Pa.—CK, CM
National Electronics Laboratories, 1713 Kalorama Rd., N.W., Washington 9, D. C.—CL, CN
National Inter-Communication Systems, 1531 Devon Ave., Chicago, 26, Ill.—CF, CI
National Electronics Mfg. Corp., 42-08 Vernon Blvd., Long Island City 1, N. Y.—CA
Nebel Leboratory, R. E., 1104 Lincoln Place, Brooklyn 13, N. Y.—CE
Neptune Electronics Co., 433 Broadway, New York 13, N. Y.—CD, CF, CI, CJ
Network Mfg. Corp., 213 W. 5th St., Bayonne, N. J.—CA, CI, CK, CN
Northern Radio Co., 134 Bell St., Seattle 1, Wash.—CK, CL, CN
O'Brien Electric Co., 5326 Sunset Blvd., Hollywood 27, Calif.—CB, CF
Onan & Son, D. W., 3264 University Ave., Minneapolis 14, Minn.—CJ
Olesen Co., Otto K., 1534 Cahuenga Blvd., Hollywood 28, Calif.—CD, CF, CG
Opad-Green Co., 71 Warren St., New York 7, N. Y.—CI
Orthon Corp., 196 Albion Ave., Paterson, N. J.—CF, CI, CJ, CK
Parts Producing Corp., Manhattan Div., 1861 Second Ave., New York 28, N. Y.—CL
Pearce-Simpson, Inc., 3023 Coral Way, Miami 34, Fla.—CA, CH, CK, CL, CN, CP
Peek, Inc., Walter E., 132 E. 44th St., Indianapolis, Ind.—CA
Pentron Corp., The, 221 E. Cullerton St., Chicago 16, Ill.—CC, CF, CI, CK, CL, CP
Perma-Power Co., 4721 N. Damen Ave., Chicago 25, Ill.—CI
PERMOFLUX CORP., 4900 W. Grand Ave., Chicago 39, Ill.—CG
Philco Corp., Tioga & C Sts., Philadelphia 34, Pa.—CA, CD, CE, CI, CJ, CK, CL, CN
Philson Mfg. Co., 60 Sackett St., Brooklyn 31, N. Y.—CA
Piezo Products Co., Whitney St., Framingham, Mass.—CE
Pioneer Electronics ,Corp., 2232 Broadway, Santa Monica, Calif.—CI, CN, CP
Precision Piezo Service, 427 Mayflower St., Baton Rouge, La.—CE
Precision Products, Inc., 719 17th St., N. W., Washington, D. C.—CE
Premax Products Div., Chisholm-Ryder Co., Highland & College Aves., Niagara Falls, N. Y.—CA
Press Wireless Mfg. Co., Cantiague Rd., Hicksville, N. Y.—CK, CN
Product Development Co., 526 Elm St., Arlington, N. J.—CA
Radio Apparatus Corp., 55 N. New Jersey St., Indianapolis 4, Ind.—CB
RADIO CORP. OF AMERICA, RCA-VICTOR DIV., Camden, N. J.—CA, CD, CE, CF, CH, CI, CJ, CK, CL, CM, CN, CP
RADIO ENGINEERING LABORATORIES, 36-40 37th St., Long Island City 1, N. Y.—CK, CL, CN
Radiomarine Corp. of America, 75 Varick St., New York 13, N. Y.—CA, CB, CK, CM, CN
Radio Specialty Mfg. Co., 2023 S.E. Sixth Ave., Portland 14, Ore.—CA, CE, CG, CH, CL, CM, CN, CP
Radio Transceiver Laboratories, 116-23 Jamaica Ave., Richmond Hill 18, L. I., N. Y.—CH, CL, CM, CN, CP
Raytheon Mfg. Co., Willow St., Waltham, Mass.—CA, CI, CJ, CP
Ready-Power Co., 11231 Freud Ave., Detroit 14, Mich.—CI, CJ
Reeves-Hoffman Corp., 321 Cherry St., Carlisle, Pa.—CE
Roanwell Corp., 662 Pacific St., Brooklyn 17, N. Y.—CG
ROBINSON AVIATION, INC., Teterboro Air Terminal, Teterboro, N. J.—CO
Rosen Engineering Products, Raymond, 32nd and Walnut Sts., Philadelphia 4, Pa.—CA, CF, CI, CK, CL, CN, CP
Rowe Industries, 1702 Wayne St., Toledo 9, Ohio—CM, CN
Sargent-Rayment Co., 212 9th St., Oakland 7, Calif.—CK
SARKES TARZIAN, see Tarzian, Sarkes
Schauer Mfg. Co., 2079 Reading Rd., Cincinnati, Ohio—CI
Schuttig & Co., 9th & Kearny Sts., N. E., Washington 17, D. C.—CA, CD, CI, CK, CM, CN
Scientific Radio Products Co., 738 W. Broadway, Council Bluffs, Iowa—CE
Scientific Radio Service, 4301 Sheridan St., University Pk., Hyattsville, Md.—CE
SHURE BROS., 225 W. Huron St., Chicago 10, Ill.—CG
Sierra Electronic Corp., 1050 Brittan Ave., San Carlos, Calif.—CI, CJ, CN
Silver Co., Inc., McMurdo, 417 Lafayette St., New York, N. Y.—CK, CL, CN
Simpson Mfg. Co., Mark, 32-28 49th St., Long Island City 3, N. Y.—CF
SNYDER MFG. CO., 22nd & Ontario Sts., Philadelphia, Pa.—CA
Sonar Radio Corp., 59 Myrtle Ave., Brooklyn 1, N. Y.—CC, CH, CK, CL, CM, CN, CP
Sorenson & Co., 375 Fairfield Ave., Stamford, Conn.—CI
Specialty Battery Co., 212 E. Washington Ave., Madison 3, Wisc.—CJ
Spellman Television Co., 3029 Webster Ave., Bronx, N. Y.—CI
Standard Electronics Corp., 25 W. 43 St., New York 18, N. Y.—CE
Standard Piezo Co., 127 Cedar St., Carlisle, Pa.—CE
Stephens Mfg. Corp., 8538 Warner Drive, Culver City, Calif.—CG, CI, CN
Suburban Radio Co., 158 Central Ave., Rochelle Park, N. J.—CB, CD, CF, CH, CI, CJ, CK, CL, CM, CN, CP
SYLVANIA ELECTRIC PRODUCTS, INC., 1740 Broadway, New York 19, N. Y.—CC, CM
Taffett Radio & Television Co., 2530 Belmont Ave., New York 58, N. Y.—CK, CL
Talk-A-Phone Co., 1512 S. Pulaski Rd., Chicago 23, Ill.—CF
Tartak-Stoll Electronics, Inc., 3970 S. Grand Ave., Los Angeles 37, Calif.—CI
TARZIAN, SARKES, INC., 539 So. Walnut St., Bloomington, Ind.—CM
Telectro Industries Corp., 35-16 37th St., Long Island City 1, N. Y.—CB, CF, CI, CJ
Tel-Instrument Co., 50 Paterson Ave., E. Rutherford, N. J.—CI
Thordarson-Meissner Mfg. Div., Maguire Industries, Inc., 500 W. Huron St., Chicago 10, Ill.—CI, CJ
Torngren Co., C. W., 236 Pearl St., Somerville, Mass.—CA
Transmitter Equip. Mfg. Co., 345 Hudson St., New York 14, N. Y.—CD, CI, CK, CL, CM, CN
Turner Co., 909 17th St., N.E., Cedar Rapids, Iowa—CG
U. S. Motors Corp., 584 Nebraska St., Oshkosh, Wisc.—CJ
U. S. Recording Co., 1121 Vermont Ave., N. W., Washington 5, D. C.—CF, CD
UNIVERSAL AVIATION CORP., 230 Park Ave., New York 17, N. Y.—CD
Valpey Crystal Corp., P. O. Box 325, Holliston, Mass.—CE
Vokar Corp., 7300 Huron River Drive, Dexter, Mich.—CH, CI
Ward Products Corp., Div. The Gabriel Corp., 1523 E. 45th St., Cleveland 3, Ohio—CA
Warren Mfg. Co., 250 East St., New Haven, Conn.—CA
West Coast Electronics Co., 1601 S. Burlington Ave., Los Angeles 6, Calif.—CK, CL, CM, CN
Western Sound & Electric Laboratories, 805 S. Fifth St., Milwaukee, Wisc.—CF
WESTINGHOUSE ELECTRIC CORP., CONSTRUCTION & COMMUNICATIONS SEC. 10L, East Pittsburgh, Pa.—CI, CK, CL, CN
Westline Electronics Co., 11660 Olympic Blvd., Los Angeles 25, Calif.—CE
WHEELER INSULATED WIRE CO., 150 E. Aurora St., Westbury 91, Conn.—CF
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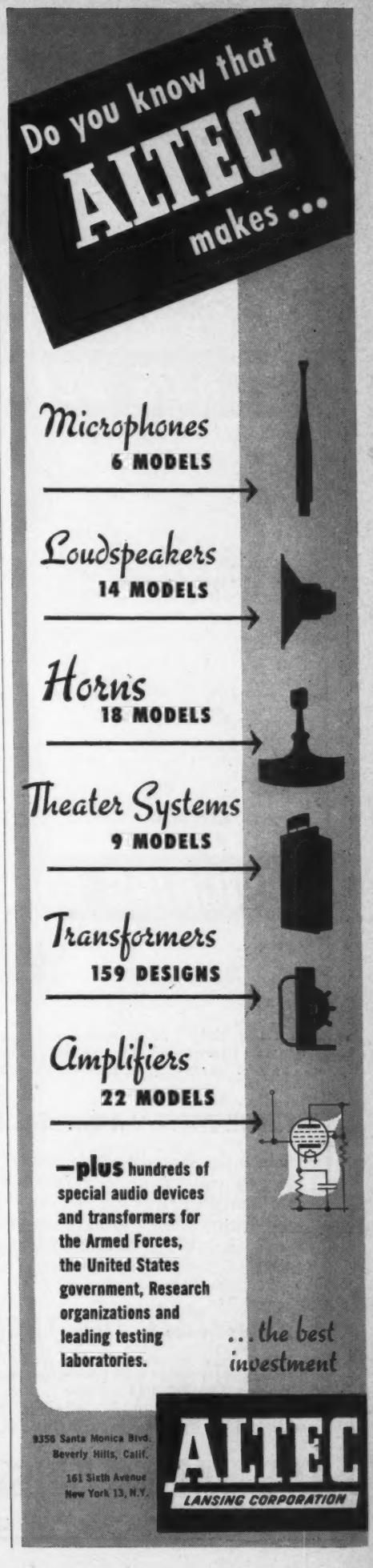
Winslow Co., 9 Liberty St., Newark 5, N. J.—CD, CF
WORKSHOP ASSOCIATES, DIV. OF THE GABRIEL CO., 135 Crescent Road, Needham Heights 94, Mass.—CA



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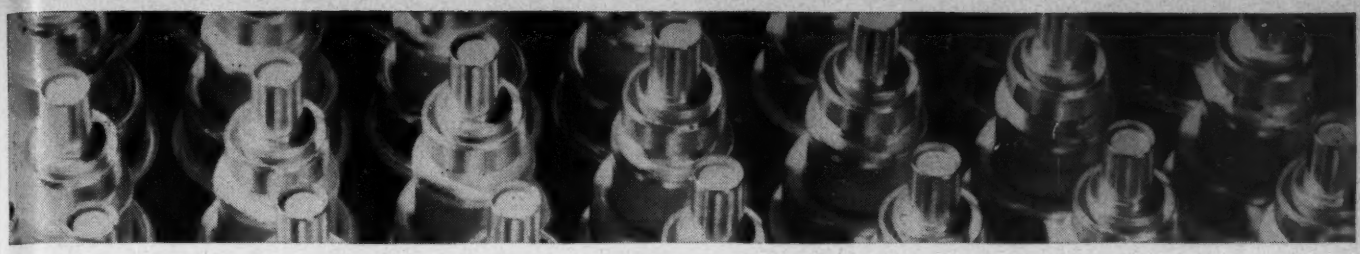
TV-FM-AM Status of Stations

TV Stations Operating	107
New TV Station Applications	415
AM Stations Authorized	2399
Licensed and "on air"	2251

FM	July '51	January 1, '50
Grantees	670	706
On Air	642	672

11 New FM Applications (Pending now)



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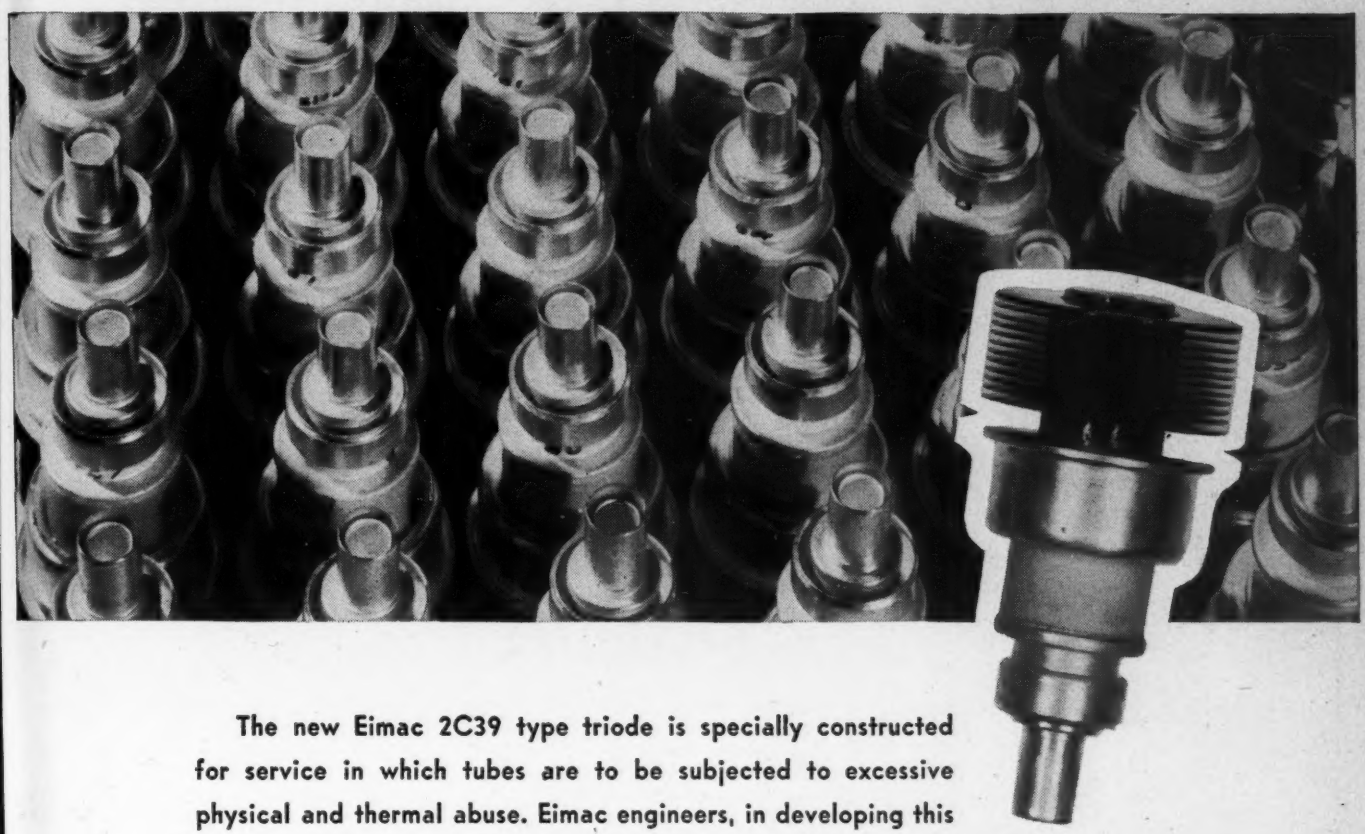

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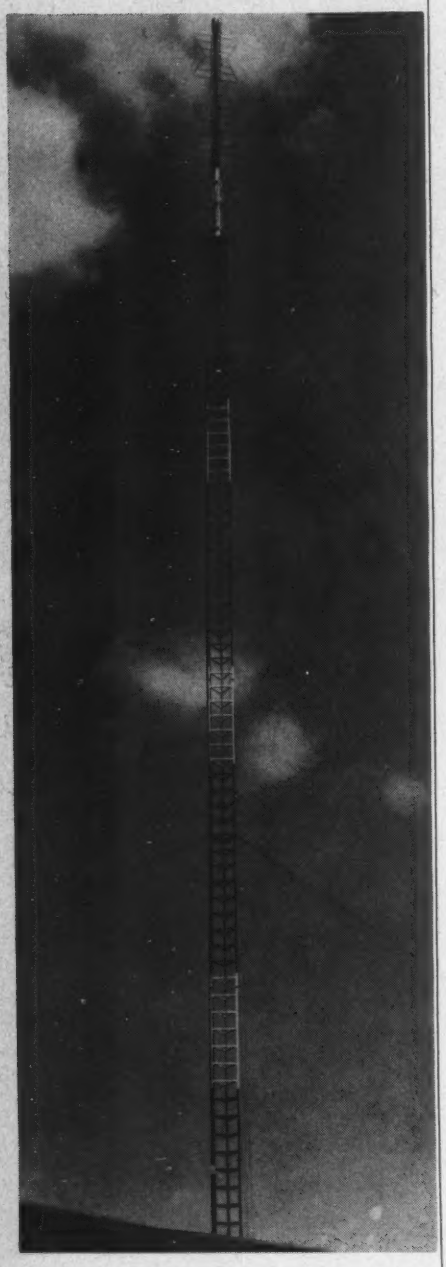

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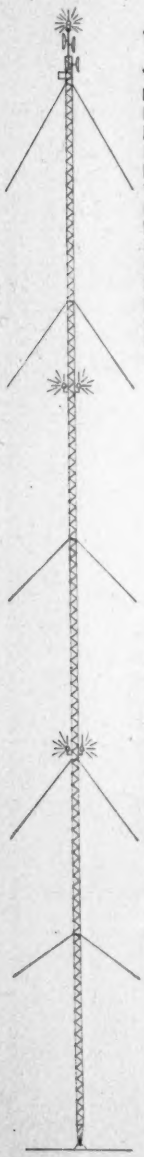

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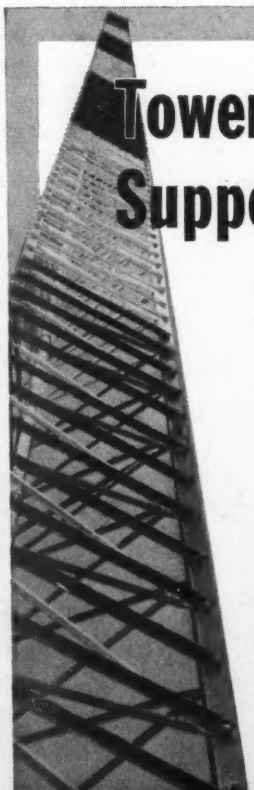
Houghton Laboratories, Inc., 322 Bush St., Olean, N. Y.—FE
HUGHEY & PHILLIPS, 4075 Beverly Blvd., Los Angeles 4, Calif.—FA, FB
International Derrick & Equip. Co., 875 Michigan Ave., Columbus 8, Ohio—FA, FN, FO
Intervox Corp., 1846 Westlake N., Seattle 9, Wash.—FB
Isolantite Mfg. Corp., Warren Ave., Stirling, N. J.—FE
Javex, Garland, Texas—FB
JFD Mfg. Co., 6127 16th Ave., Brooklyn 4, N. Y.—FE
JOHNSON CO., E. F., 206 Second Ave., S. W., Waseca, Minn.—FE, FF, FH
Jones Electronics Co., M. C., 96 N. Main St., Bristol, Conn.—FC, FK, FL
Kay Electric Co., Maple Ave., Pine Brook, N. J.—FL
Kings Electronics Co., 50 Marbledale Rd., Tuckahoe, N. Y.—FH, FP
Kings Microwave Co., 50 Marbledale Rd., Tuckahoe, N. Y.—FC, FH, FL
Kliegl Bros., 321 W. 50th St., New York 19, N. Y.—FA
LaPointe Plascomold Corp., Windsor Locks, Conn.—FO
Lapp Insulator Co., LeRoy, N. Y.—FE
Lavoie Laboratories, Inc., Matawan-Freehold Rd., Morganville, N. J.—FH
Lehigh Structural Steel Co., 17 Battery Place, New York 4, N. Y.—FN, FO
Lingo & Son, John E., 2814 Buren Ave., Camden 5, N. J.—FE, FN, FO
Link Radio Corp., 125 W. 17 St., New York 11, N. Y.—FA, FI, FO, FP
Locke, Dept. of General Electric Co., P. O. Box 57, Baltimore 3, Md.—FE
Marconi Instruments, Ltd., 23 Beaver St., New York 4, N. Y.—FK
Mesker Steel Corp., George L., Evansville 8, Ind.—FO
Millen Mfg. Co., James, 150 Exchange St., Malden 48, Mass.—FL
Mueller Electric Co., 1583 E. 31st St., Cleveland 14, Ohio—FE
Network Mfg. Corp., 213 W. 5th St., Bayonne, N. Y.—FB, FC, FH
New England Electrical Works, 365 Main St., Lisbon, N. H.—FD
Ohmite Mfg. Co., 4835 W. Flournoy St., Chicago 44, Ill.—FC
Pearce Simpson, Inc., 3023 Coral Way, Miami 34, Fla.—FB
Philco Corp., Tioga & C Sts., Philadelphia 34, Pa.—FB
Porcelain Prods., Inc., P. O. Box 300, Findlay, Ohio—FE
Premax Products Div., Chisholm-Ryder Co., Highland & College Aves., Niagara Falls, N. Y.—FB, FE
Press Wireless Mfg. Co., Cantiague Rd., Hicksville, N. Y.—FC
Product Development Co., 526 Elm St., Arlington, N. J.—FA, FO
RADIO CORP. OF AMERICA, RCA-VICTOR DIV., Camden, N. J.—FA, FD, FH, FI, FJ, FN, FO, FP
RADIO ENGINEERING LABORATORIES, 36-40 37th St., Long Island City 1, N. Y.—FI
Reeves-Hoffman Corp., 321 Cherry St., Carlisle, Pa.—FH
Roller-Smith Corp., 1000 8th Ave., Bethlehem, Pa.—FM
Rostan Corp., 383 Kent 9ve., Brooklyn 11, N. Y.—FB, FO



Tower, Mast and Antenna Support *Headquarters*

- **Guyed supporting towers for TV-FM antennas**
- **TRYLON Vertical Radiators**
- **Micro-wave relay towers**
- **Complete antenna systems with switching units**
- **Communications antenna supports . . . and dozens of special items**

Hundreds of installations in all parts of the world, under all conditions of use attest to Trylon Tower dependability. As specialists in antenna supports for over 18 years, Trylon offers a broad, time-tested line of standard units plus complete facilities for the economical production of special types and designs.

Write for literature on any desired type—or, better yet, outline your antenna support problem for recommendation by Trylon specialists.

Trylon Towers are made only by

WIND TURBINE CO.

WEST CHESTER, PA.

TRYLON

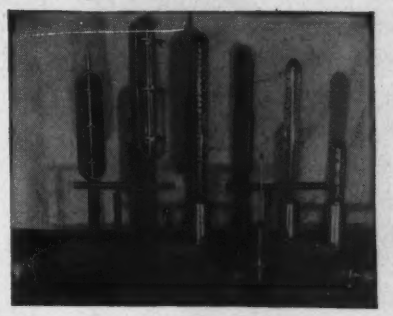
WORKSHOP antennas

A Complete Line for all High-Frequency Bands

COMMERCIAL		GOVERNMENT
AMATEUR	RADIO RELAY	RADAR
TELEVISION	MICROWAVE RELAY	GUIDED MISSILE OR ROCKET-BORNE
FM	STL RELAY	COMMUNICATION AND NAVIGATION
EMERGENCY SERVICES	TV RELAY	

The WORKSHOP line covers all bands from 28 mc. up. Our standard antennas fit the majority of applications, but where special situations must be met, slight modifications in design usually accomplish the desired result.

Engineering and Contract Service. The WORKSHOP handles scores of special government and commercial antenna problems every year from design through production. With our new plant and greatly expanded facilities, we are able to handle a larger proportion of this type of contract work than ever before.



A representative group of high-precision radar antennas.

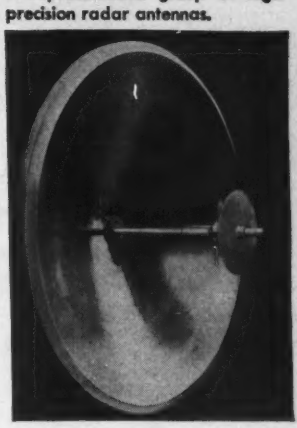
TYPE and USE	MODEL NO.	FREQUENCY (MCS.)	GAIN* (DB.)	HALF POWER ANGLE E Plane*	H Plane*
PARABOLIC For radio, microwave, STL and TV relay, radar, and communications.	940	920– 960	19.0–28.0	19.75–7.8	17.75–6.9
	2000	1990–2110	27.0–34.5	10.28–3.65	9.2 –3.25
	6075	5925–6225	36.0–42.0	3.24–1.47	2.86–1.32
	6725	6575–6875	36.8–42.8	2.79–1.47	2.50–1.32
	7275	7125–7425	37.0–43.0	2.70–1.36	2.42–1.21

*Gain and Half Power Angles are dependent on size of parabolas, — 4, 6, 8 or 10 foot diameter.

				Horizontal	Vertical
DIRECTIONAL and BI-DIRECTIONAL For police, highway patrol, railway, forestry, utilities, oil fields.	33C	29.5–36.5	7.8	64°	68°
	40C	36.5–43.5	7.8	64°	68°
	47C	43.5–50.5	7.8	64°	68°
	74C	72–76	7.8	64°	68°
	144C	140–146	7.8	64°	68°
	149C	146–152	7.8	64°	68°
	155C	152–157	7.8	64°	68°
	160C	157–162	7.8	64°	68°
	165C	162–168	7.8	64°	68°
	171C	168–174	7.8	64°	68°

BEACON For fire, police, taxicab, aeronautical, and private fleet communications.	2HW	108–144	2.7	31°
	3HW-B	144–152	4.2	24°
	3HW-A	152–162	4.2	24°
	3HW-2	162–174	4.2	24°
	6HW-A	450–460	8	
	6HW-B	460–470	8	

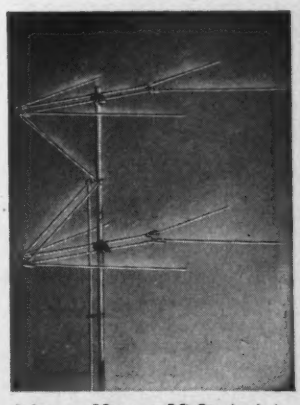
TELEVISION	A	3-element, high gain (5 db.), directional; a model for each TV channel.
	2A	Two series A's spaced ½ wave apart, connected by cable harness.
	VV	All-channel, high gain, sharp directivity, patented.
	2VV	Double-stacked VV for higher gain, distant reception.
AMATEUR		A complete line for 2, 6, 10 meters and UHF.



Standard Parabolic Relay Antenna for Studio-to-Transmitter Link on 920-960 mc. band.

Left — High-Gain Beacon Antenna. Recommended by all 152-162 mc. equipment manufacturers. Hundreds are in use throughout the country.

Below — WORKSHOP DUBL-VEE Television Antenna, double-stacked.



Below — 10 over 20 Stacked Array — the last word in amateur antenna equipment.

CABLE FITTINGS AND ACCESSORIES

Model T-72 Matching Transformer. Matches 72 ohm coaxial cable such as RG-59/U to 300 ohm receivers. Voltage step up of 2 : 1, with a flat response over the TV channels from 52-216 mcs. A W-50 solderless cable connector is furnished. Size 2 inches long, 1-inch diameter.

Model T-300 Exterior Matching Transformer. Completely weatherproof device for converting 72 ohm antennas for use with inexpensive 300 ohm Twin Lead transmission line at reasonable efficiency. Can also be used with 300 ohm antennas to realize benefits of 72 ohm coaxial cable.

Model W-50 Silver Plated Solderless Cable Connector (Male). Used with RG-59/U coaxial cable. Specially slotted to withstand considerable strain. Mates with W-60 receptacle (on R-4A switch) and W-80 junction listed below.

Model W-60 Silver Plated Chassis Receptacle (Female). Mates with W-50 cable connector. For chassis or panel mounting. Threaded stem ⅜ inch long. Soldering terminal protrudes from rear.

Model W-80 Silver Plated Cable or Panel Junction (Female). Mates at either end with W-50 male connector. A complete splice requires one W-80 junction and two W-50 connectors which must be ordered separately.

Model W-100 Cable Adaptor. Required when changing from larger size RG-11/U or RG-8/U to smaller RG-59/U coaxial cables. No soldering necessary. W-50 cable connector furnished.

Model R-4A New Coaxial Switch (SP4T). This virtually lossless, constant impedance switch will connect any one of four single-channel TV antennas to a receiver. By simply using additional switches it can also be used for demonstrating any number of TV receivers in a display room, or for low-level audio applications. Size — 2⅜ inches front to back; 2-inch diameter.

If your product or service requires high-frequency antennas—research, design, test, or production—get in touch with the WORKSHOP. Write, or phone Needham 3-0005. No obligation.

THE WORKSHOP ASSOCIATES

DIVISION OF THE GABRIEL COMPANY

135 CRESCENT ROAD, NEEDHAM HEIGHTS 94, MASSACHUSETTS

WHAT ARE *Your* REQUIREMENTS IN PARABOLIC ANTENNAS ?

For microwave systems . . . check these advantages of ANDREW Parabolic Antennas:

☐ **DEPENDABILITY**—*An actual record of 100% dependability.* There has *never* been a single mechanical or electrical failure on an ANDREW Parabolic Antenna . . . anywhere in the world.

☐ **COST**—Exceptionally low; made possible by high production.

☐ **LIGHT WEIGHT—HIGH STRENGTH**—Achieved by spun aluminum reflectors braced by formed steel struts.

☐ **ADJUSTABLE MOUNTING**—Through ± 10 degrees in azimuth and elevation.

☐ **DEICING KITS**—Thermostatically controlled, available where required.

☐ **CABLE**—⅞" air dielectric Teflon insulated cable. Radiator is pressure tight. Fittings for solid dialectric cables also available.

SPECIFICATIONS

Frequency Range	...890-960 MCS...				...1750-2110 MCS...			
Type Number	1002	1004	1006	1010	2002	2004	2006	2010
Diameter of Parabola feet	2	4	6	10	2	4	6	10
Gain Over Half Wave Dipole Decibels	10	15	20	25	15	20	25	29
Beam Width, Half Power Points, Degrees	36°	22°	16°	11°	18°	10°	7°	5°
Net Weight, Pounds	10	64	150	380	10	65	150	380
Thrust Due to Wind Loading at 30 Pounds/FT Pounds	127	509	1145	3200	127	509	1145	3200

Your antenna problems can best be solved by ANDREW—the largest firm of antenna equipment specialists in the world. Write today.

Andrew CORPORATION
363 EAST 75th STREET • CHICAGO 19

ANDREW

WORLD'S LARGEST ANTENNA EQUIPMENT SPECIALISTS

TRANSMISSION LINES FOR AM-FM-TV • ANTENNAS • DIRECTIONAL ANTENNA EQUIPMENT
ANTENNA TUNING UNITS • TOWER LIGHTING EQUIPMENT

Rowe Industries, 1702 Wayne St., Toledo 9, Ohio—FH, FM
Schumaker Construction Co., Michigan City, Ind.—FB
Skyline Tower Co., 5900 S. Ashland Ave., Chicago 36, Ill.—FO
SPERRY GYROSCOPE CO., DIV. SPERRY CO., Great Neck, N. Y.—FG, FH, FK, FL
STAINLESS INC., 3rd St., N. Wales, Pa.—FO, FB
States Co., 19 New Park Ave., Hartford 6, Conn.—FC
Steward Mfg. Co., D. M., 3600 Jerome Ave., Chattanooga, Tenn.—FE
Superior Porcelain Co., 931½ Market St., Parkersburg, W. Va.—FE
Thompson Products, Inc., 2096 Clarkwood Rd., Cleveland 3, Ohio—FM
SYNTHANE CORP., 12 River Rd., Oaks, Pa.—FE
Time-O-Matic Co., P. O. Box 850, Danville, Ill.—FA
Torngren Co., C. W., 236 Pearl St., Somerville, Mass.—FA
Tower Construction Co., 107 4th St., Sioux City, Iowa—FN, FO
Truscon Steel Co., Albert St., Youngstown 1, Ohio—FA FE, FN, FO
Upright Scaffolds, Div. Up-Right Inc., 1013 Pardee St., Berkeley 10, Calif.—FO
Vesto Co., Parkville, Mo.—FN, FO
Ward Prods. Corp., 1523 E. 45th St., Cleveland 3, Ohio—FB, FE, FI
Warren Mfg. Co., 250 East St., New Haven, Conn.—FA
WESTINGHOUSE ELECTRIC CORP., CONSTRUCTION & COMMUNICATIONS SEC. 10-L, E. Pittsburgh, Pa.—FA, FH
Wheeler Laboratories, Great Neck, L. I., N. Y.—FB
Wincharger Corp., 7th & Division Sts., Sioux City, Iowa—FA, FN, FO
WIND TURBINE CO., E. Market St. & P. R. R., West Chester, Pa.—FA, FD, FE, FN, FO
Winslow Co., 9 Liberty St., Newark 5, N. J.—FH
WORKSHOP ASSOCIATES, 135 Crescent Rd., Needham Heights 94, Mass.—FB, FJ

7—Studio Transmitter Links & TV Microwave Relay Equipment

Antennas ..... IK
Antennas, microwave ..... IA
Antennas, UHF ..... IB
Auxiliary equipment IC
Microwave accessories ..... ID
Microwave complete relay unit ..... IE
Microwave equipment ..... IF
Microwave test equipment IL
Radomes ..... IM
Receivers, studio link ..... IH
Transmitters ..... IG

Airtron, Inc., 101 E. Elizabeth Ave., Linden, N.J.—IA, ID, IF
Alpar Mfg. Co., 466 St. Francis St., Redwood City, Calif.—IA
American Electroneering Co., 5025 W. Jefferson Blvd., Los Angeles 16, Calif.—IG, IH
AMERICAN PHENOLIC CORP., 1830 S. 54th Ave., Chicago 50, Ill:—1A, 1B
ANDREW CORP., 363 E. 75th St., Chicago 19, Ill.—IA, IB
Antenna Research Laboratory, Inc., 797 Thomas Lane, Columbus 14, Ohio—IA, IB, ID
Automatic Electric Sales, 1033 W. Van Buren St., Chicago 7, Ill.—IC, IF
Canoga Corp., 14315 Bessemer St., Van Nuys, Calif.—IA, IF
Clear Beam Antennas, 100 Prospect Ave., Burbank, Calif.—IK
Communication Devices Co., 2331 12th Ave., New York 27, N.Y.—IG, IH
Dalmo Victor Co., 1414 El Camino Real, San Carlos, Calif.—IF, IK
DuMONT LABORATORIES, INC., ALLEN B., 1000 Main Ave., Clifton, N. J.—IA, IC, ID, IE, IF, IG, IH
FEDERAL TELECOMMUNICATION LABORATORIES, INC., 500 Washington Ave., Nutley 10, N. J.—IA, IB, IC, ID, IE, IF, IG, IH
FEDERAL TELEPHONE & RADIO CORP., 100 Kingsland Rd., Clifton, N. J.—IA, ID, IE, IF, IG, IH
GATES RADIO CO., Quincy, Ill.—IH
GENERAL ELECTRIC CO., ELECTRONIC DEPT., Syracuse, N. Y.—IC, ID, IE, IF, IG, IH, IK, IL
GENERAL PRECISION LABORATORIES, INC., 63 Bedford Rd., Pleasantville, N. Y.—IH
G. W. Associates, P. O. Box 2263, El Segundo, Calif.—IA, ID, IE, IF
Hammarlund Mfg. Co., 460 W. 34th St., New York 1, N. Y.—IC
Holub Industries, Inc., Sycamore, Ill.—IC
Insuline Corp. of America, 3602 35th Ave., Long Island City 1, N.Y.—IB
I-T-E Circuit Breaker Co., 19th & Hamilton Sts., Philadelphia 30, Pa.—IA
Jamaica Television Mfg. Co., 95-26 Sutphin Blvd., Jamaica 4, L. I., N. Y.—IG, IH, IK
Jones Electronics Co., M. C., 96 N. Main St., Bristol, Conn.—IC
Kings Electronics Co., 50 Marbledale Rd., Tuckahoe, N.Y.—IF
Kings Microwave Co., 50 Marbledale Rd., Tuckahoe, N.Y.—IA, IB, ID, IF
LaPointe Plascomold Corp., Windsor Locks, Conn.—IB
Leru Laboratories, 360 Bleecker St., New York 14, N.Y.—ID, IF, IL
Link Radio Corp., 125 W. 17th St., New York 11, N.Y.—IC, IF, IG, IH, IK
Lingo & Son, Inc., John E., 2814 Buren Ave., Camden 5, N.J.—IA, IB
Lumenite Electronic Co., 407 S. Dearborn St., Chicago 5, Ill.—IG, IH

MICO INSTRUMENT CO., 75 Trowbridge St., Cambridge, Mass.—JE
Micro Engineering Corp., 15 E. Tujunga Ave., Burbank, Calif.—IF
Microwave Equipment Co., Greenbrook Rd., N. Caldwell, N. J.—IA, IC, ID, IE, IF, IK, IL
Modulation Prods. Co., 56 Lispenard St., New York, N. Y. —IG, IH
MOTOROLA, INC., 4545 Augusta Blvd., Chicago 51, Ill. —IF
Network Mfg. Corp., 213 W. 5th St., Bayonne, N.J.—IA, IB, IF, IK
Peek, Inc., Walter E., 132 E. 44th St., Indianapolis, Ind. —IK
Philco Corp., Tioga & C. Sts., Philadelphia 34, Pa.—IA, IC, ID, IE, IF, IG, IH, IG, IH, IK, IL
Polytechnic Research & Development Co., 202 Tillary St., Brooklyn 1, N.Y.—ID, IF, IL
Premax Prods., Div. Chisholm-Ryder Co., Highland & College Aves., Niagara Falls, N.Y.—IB
Premier Instrument Corp., 52 W. Houston St., New York 12, N.Y.—ID
Press Wireless Mfg. Co., Cantiague Rd., Hicksville, N.Y. —ID, IF
Product Development Co., 526 Elm St., Arlington, N.J. —IA, IB
RADIO CORP. OF AMERICA, RCA VICTOR DIV., Camden, N. J.—IA, IC, ID, IE, IF, IG, IH, IK, IL
RADIO ENGINEERING LABORATORIES, INC., 36-40 37th St., Long Island City 1, N. Y.—IA, IB, IE, IF, IG, IH
Raytheon Mfg. Co., Willow St., Waltham, Mass.—IA, ID, IE, IF
Rowe Industries, 1702 Wayne St., Toledo 9, Ohio—IA, IB, ID
Sierra Electronic Corp., 1050 Brittan Ave., San Carlos, Calif.—IH
Skydyne, Inc., P. O. Box 1106, Port Jervis, N. Y.—IL
SPERRY GYROSCOPE CO., DIV., SPERRY CORP., Great Neck, N. Y.—ID, IF
Stephens Mfg. Corp., 8538 Warner Drive, Culver City, Calif.—IG, IH
SYLVANIA ELECTRIC PRODUCTS CO., 1740 Broadway, New York 19, N. Y.—IC, ID
TELECHROME, INC., 88 Merrick Rd., Amityville, L. I., N. Y.—IC, ID, IG, IH
Terpening Co., L. H., 16 W. 61st St., New York 23, N.Y.—ID
Torngren Co., C. W., 236 Pearl St., Somerville, Mass.—IA
Varian Associates, 99 Washington St., San Carlos, Calif. —IA, IF, IG, IH
Ward Prods. Corp., Div. Gabriel Corp., 1523 E. 45th St., Cleveland 3, Ohio—IA, IB
Warren Mfg. Co., 250 East St., New Haven, Conn.—IK
WELLS SALES, INC., 833 W. Chicago Ave., Chicago 22, Ill.—IA, IB
Weymouth Instrument Co., 1440 Commercial St., E. Weymouth 89, Mass.—IA, ID, IF
Wincharger Corp., E. 7th & Division Sts., Sioux City, Iowa—IA
WIND TURBINE CO., E. Market St. & P. R. R., West Chester, Pa.—IB
WORKSHOP ASSOCIATES, DIV. GABRIEL CO., 135 Crescent Rd., Needham Heights 94, Mass.—IA, IB, ID

8—Point-to-Point Microwave Communication Equipment

Antennas ..... JA
Auxiliary ..... JB
Complete package ..... JC
Receiver ..... JD
Slotted lines ..... JK
Test equipment ..... JE
Towers ..... JF
Transmission Line ..... JM
Transmitter ..... JG
Waveguide, couplings ..... JH
Waveguide, flexible ..... JI
Waveguide, rigid ..... JJ
Waveguide switches ..... JL

Airtron, Inc., 101 E. Elizabeth Ave., Linden, N. J.—JA, JE, JH, JI, JJ, JK
Alpar Mfg. Co., 466 St. Francis St., Redwood City, Calif. JA, JF
Alprodco, Inc., Rt. 2, Box 94, Mineral Wells, Texas and Kempton, Ind.—JF
AMERICAN PHENOLIC CORP., 1830 S. 54th Ave., Chicago 50, Ill.—JA
ANDREW CORP., 363 E. 75th St., Chicago 19, Ill.—JA
Antenna Research Laboratory, Inc., 797 Thomas Lane, Columbus 14, Ohio—JA, JE
Associated Research, Inc., 3758 W. Belmont Ave., Chicago 18, Ill.—JE
Bart Laboratories Co., 229 Main St., Belleville 9, N. J.—JJ
Basset, Inc., Rex, 311 N. W. 1st Ave., Fort Lauderdale, Fla.—JD, JE, JG
Calnevar Co., Microwave Div., 1732 W. Washington Blvd., Los Angeles 7, Calif.—JE, JH, JJ
Canoga Corp., 14345 Bessemer St., Van Nuys, Calif.—JA JD, JE, JJ
Coil Winders, Inc., 61 Bergen St., Brooklyn 2, N. Y.—JE
Dalmo Victor, 1414 El Camino Real, San Carlos, Calif. —JJ
Edin Co., 207 Main St., Worcester 8, Mass.—JE
Electronic Measurements Co., Red Bank, N. J.—JE, JG
Electro-Tech Equip. Co., 309 Canal St., New York 13, N. Y.—JE
Elizabeth Iron Works, Inc., P.O. Box 360, Elizabeth 8, N. J.—JF
FEDERAL TELECOMMUNICATION LABORATORIES, INC., 500 Washington Ave., Nutley 10, N. J.—JA, JB, JC, JD, JE, JG
FEDERAL TELEPHONE & RADIO CORP., 100 Kingsland Road, Clifton, N. J.—JD, JG
Frequency Standards Corp., Box 66, Eatontown, N. J.—JE

Radio-TV Output Up

Despite shortages of critical materials and increased Government regulations, production of radio and television receivers in the first half of 1951 exceeded the industry's output in the corresponding period of last year, the Radio-Television Manufacturers Association reported. RTMA pointed out, however, that production in the second quarter was considerably below the output in the first three months of last year.

	Television	Home Radios
Jan.	645,716	780,410
Feb.	679,319	795,377
March	874,634	1,027,745
April	469,157	644,527
May	339,132	604,904
June	326,547	360,031
Total	3,334,505	4,212,994

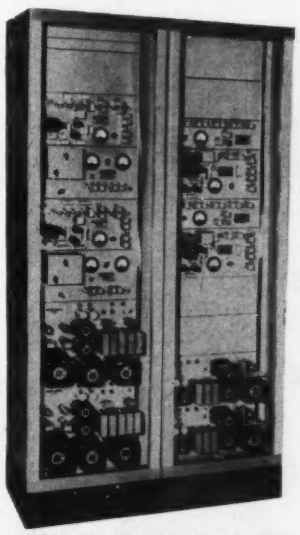
	Portables	Auto Sets
Jan.	75,294	346,799
Feb.	79,859	437,779
March	147,037	545,297
April	150,494	542,021
May	164,171	603,534
June	228,454	494,202
Total	845,309	2,969,632

REL... *Engineering Leadership*

in FREQUENCY MODULATION MULTIPLEXING EQUIPMENT

All employing the ***SERRASOID**** Modulator, noted for its simple and reliable operation. Has no tuned circuits. Uses only standard receiver type tubes.

Because of high standards of research and design, coupled with rigid standards of quality, REL equipment has always represented the greatest advances in FM transmitters and receivers.

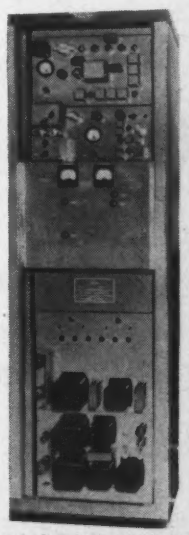


70 MC FM DUAL TRANSMITTERS & RECEIVERS Model 759

Preferred by

BROADCAST STATIONS • AIRLINES • TELEPHONE & TELEGRAPH COMPANIES • INDUSTRIAL SYSTEMS • UNIVERSITIES FOREIGN & DOMESTIC MUNICIPAL DEPARTMENTS.

Radio equipment as illustrated can be supplied to meet rigid operational requirements in carrier frequency range from 70 to 2,000 MC and in modulation band widths up to 200 KC in multiplex operations, suitable for voice, program, telegraph, teletype, remote control, telemetering and facsimile up to the equivalent of 50 voice circuits.



900 MC FM TRANSMITTER & RECEIVER for MULTIPLEX RELAY. Model 707-757

Some Other Products of REL

FM BROADCAST TRANSMITTERS • MOBILE REMOTE PICKUP • ***SERRASOID**** FM MODULATORS • SPECIAL PURPOSE FM RECEIVERS

For Ease of Installation . . . Economy of Operation . . . Absolute Dependability . . . REL Units Stand Alone . . . Inquiries Are Invited for Specific Applications.

*T.M.Registered

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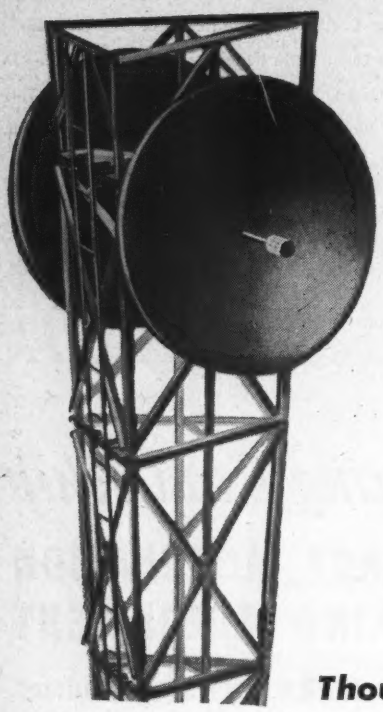
36-40 37th Street, LONG ISLAND CITY 1, N.Y.

COMPLETE COMMUNICATIONS by *Federal*



PTM MICROWAVE

For Every Circuit Application

PIPE LINES • TELEPHONE COMPANIES • POWER UTILITIES
RAILROADS • RADIO-TV BROADCAST • AVIATION AND OTHERS

- **Instantaneous,** continuous, dependable service—without costly line construction or maintenance.
- **Most** positive basic channels for all requirements: telephone, telegraph, teleprinter, facsimile, telemetering, supervisory control, speech-plus-duplex, signaling and dialing, dispatcher circuits—with tie-in of all mobile radio units.
- **Equipment** of highest power and simplest design assures superb performance . . . outstanding for long-distance operation.
- **PTM** is the proved-in-service system—backed by the world-wide research, manufacturing and operating experience of International Telephone and Telegraph Corporation.

Thousands of Channel-miles Now Operating in 15 Countries

Federal

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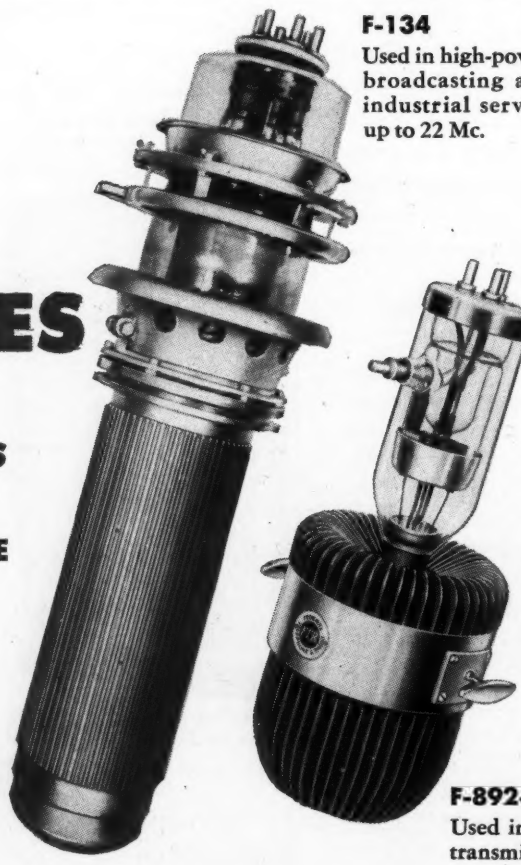
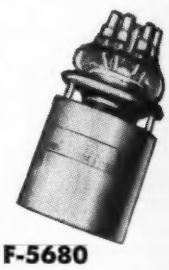
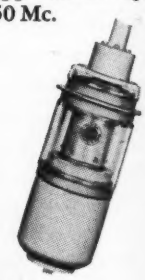


F-134
Used in high-power broadcasting and industrial service up to 22 Mc.



F-5680
Used in broadcasting and industrial applications up to 50 Mc.



F-5512
Used in FM broadcasting, industrial and research applications up to 110 Mc.

F-892-R
Used in 5 and 10 KW AM transmitters.

2J36
Magnetrons for all requirements.

FEDERAL TELECOMMUNICATION LABORATORIES, Nutley, N. J. . . . . a unit of IT&T's world-wide research and engineering organization.

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In Canada: Federal Electric Manufacturing Company, Ltd., Montreal, P. Q.
Export Distributors: International Standard Electric Corp., 67 Broad St., N.Y.

GENERAL PRECISION LABORATORIES, INC., 63 Bedford Rd., Pleasantville, N. Y.—JG, JH, JI, JJ
G. W. Associates, P. O. Box 2263, El Segundo, Calif.—JA, JB, JC, JD, JE, JF, JG, JH, JI, JJ
Hammarlund Mfg. Co., 460 W. 34th St., New York 1, N. Y.—JB
Haygren Electronic Mfg. Co., 436 18th St., Brooklyn 15, N. Y.—JA
HICKOK ELECTRICAL INSTRUMENT CO., 10514 Dupont Ave., Cleveland 8, Ohio—JE
Holub Industries, Inc., Sycamore, Ill.—JB
International Derrick & Equipment Co., 875 Michigan Ave., Columbus 8, Ohio—JF
I-T-E Circuit Breaker Co., 19th & Hamilton Sts., Philadelphia 30, Pa.—JA
Jones Electronics Co., M. C., 96 N. Main St., Bristol, Conn.—JB
Kay Electric Co., Maple Ave., Pine Brook, N. J.—JE
Kings Microwave Co., 50 Marbledale Rd., Tuckahoe N. Y.—JA, JE, JH, JJ
LaPointe Plascomold Corp., Windsor Locks, Conn.—JF
Lehigh Structural Steel Co., 17 Battery Place, New York 4, N. Y.—JF
Lingo & Son, Inc., John E., 2814 Buren Ave., Camden 5, N. J.—JA, JF
Marconi Instruments, Ltd., 23 Beaver St., New York, N. Y.—JE
MELPAR, INC., 452 Swann Ave., Alexandria, Va.—JC
MICO INSTRUMENT CO., 75 Trowbridge St., Cambridge, Mass.—JE
Millen Mfg. Co., James, 150 Exchange St., Malden 48, Mass.—JE
MOTOROLA, INC., 4545 Augusta Blvd., Chicago, Ill.—JB, JC, JD, JG
Network Mfg. Corp., 213 W. 5th St., Bayonne, N. J.—JA, JE
Nichols Products Co., 325 W. Main St., Moorestown, N. J.—JK
Philco Corp., Tioga & C Sts., Philadelphia 34, Pa.—JA, JB, JC, JD, JE, JF, JG, JH, JI, JJ
Precise Development Corp., 999 Longbeach Rd., Oceanside, L. I., N. Y.—JE
Premax Products Div. Chisholm-Ryder Co., Inc., Highland & College Aves., Niagara Falls, N. Y.—JA
Press Wireless Mfg. Co., Cantiague Rd., Hicksville, N. Y.—JG, JH, JI, JJ
Product Development Co., 526 Elm St., Arlington, N. J.—JA, JC, JF
RADIO ENGINEERING LABORATORIES, INC., 36-40 37th St., Long Island City 1, N. Y.—JA, JC, JD, JG
Raytheon Mfg. Co., Willow St., Waltham, Mass.—JA, JH, JI, JJ
Rowe Industries, 1702 Wayne St., Toledo 9, Ohio—JE
Sierra Electronic Corp., 1050 Brittan Ave., San Carlos, Calif.—JE, JG
SIMPSON ELECTRIC CO., 5208 W. Kinzie St., Chicago 44, Ill.—JE

MICO

Precision Apparatus

UHF COAXIAL WAVEMETERS

2 - 75 CENTIMETER RANGE

MODEL 433 .....20 to 75 Centimeters
MODEL 501 ..... 4 to 20 Centimeters
MODEL 402A ... 2 to 10 Centimeters
MODEL 402B ... 2 to 10 Centimeters (Reaction Type)

MICO INSTRUMENT CO.
75 Trowbridge St., Cambridge, Mass.

Stephens Mfg. Corp., 8538 Warner Drive, Culver City, Calif.—JG
Technicraft Laboratories, Thomaston, Conn.—JH, JI, JK
Titeflex, Inc., 500 Frelinghuysen Ave., Newark 5, N. J.—JH, JI, JJ
Torngren Co., C. W., 236 Pearl St., Somerville, Mass.—JA
Tower Construction Co., 107 4th St., Sioux City, Iowa—JF
Transmitter Equip. Mfg. Co., 345 Hudson St., New York 14, N. Y.—JC, JD, JG
Truscon Steel Co., Albert St., Youngstown 1, Ohio—JF
Varian Associates, 99 Washington St., San Carlos, Calif.—JG
Ward Products Corp. Div. Gabriel Corp., 1523 E. 45th St., Cleveland 3, Ohio—JA
Western Electronic Enterprises, 3348 W. Compton Blvd. Gardena, Calif.—JH
Wincharger Corp., E. 7th & Division Sts., Sioux City, Iowa—JA, JF
WIND TURBINE CO., E. Market St. & P. R. R., West Chester, Pa.—JA, JF
WORKSHOP ASSOCIATES, DIV. GABRIEL CO., 135 Crescent Rd., Needham Heights 94, Mass.—JA, JH

RECEIVING EQUIPMENT

9—Receivers

Antennas, TV Receiver ..... **HJ**
Aviation, fixed ..... **HA**
Aviation, mobile ..... **HB**
Broadcast, AM ..... **HG**
Broadcast, FM ..... **HD**
Broadcast, TV ..... **HE**
Communication, AM ..... **HF**
Communication, FM ..... **HG**
Remote PU, fixed ..... **HH**
Remote PU, mobile ..... **HI**
Special purpose ..... **HL**
Civilian defense ..... **HM**
Tuners, TV ..... **HK**

ADMIRAL CORP., 3800 Cortlandt St., Chicago 47, Ill.—HC, HD, HE
Aeronautical Radio Mfg. Co., 155 First St., Mineola, N. Y.—HB
AIRCRAFT RADIO CORP., Boonton, N. J.—HB
Air Marshall Corp., 12 E. 44th St., New York 17, N. Y.—HE
ALTEC LANSING CORP., 9356 Santa Monica Blvd., Beverly Hills, Calif.—HC, HD
American Communications Corp., 306 Broadway, New York 7, N. Y.—HA, HC, HL, HM
American Electroneering Co., 2112 S. LaBrea, Los Angeles 16, Calif.—HH
American Television, Inc., 523 S. Plymouth Ct., Chicago 5, Ill.—HE
Andrea Radio Corp., 27-01 Bridge Plaza N., Long Island City 1, N. Y.—HC, HD, HE
Ansley Radio & Television, Inc., 85 Tremont St., Meriden, Conn.—HC, HD, HE
Approved Electronic Instrument Corp., 142 Liberty St., New York 6, N. Y.—HC, HG
ARF Prods., Inc., 7627 W. Lake St., River Forest, Ill.—HG, HL
Arvin Industries, Inc., Columbus, Ind.—HC, HE
Atwater Television Co., 360 Furman St., Brooklyn, N. Y.—HC, HD, HE
Automatic Electric Sales, 1033 W. Van Buren St., Chicago 7, Ill.—HH, HI
Automatic Radio Mfg. Co., 122 Brookline Ave., Boston 15, Mass.—HC, HD, HE
Bace Television Corp., Green & Leuning Sts., S. Hackensack, N. J.—HE
Bassett, Inc., Rex, 311 N. W. 1st Ave., Ft. Lauderdale, Fla.—HA, HB, HF, HL, HM
Bell Television, Inc., 552 W. 53rd St., New York 19, N. Y.—HE
BENDIX RADIO DIV., BENDIX AVIATION CORP., Baltimore 4, Md.—HA, HB, HC, HD, HE, HF, HG, HM
Berger Communications, 109-21 72nd Rd., Forest Hills, L. I., N. Y.—HC, HD, HE
Berkeley Custom Electronics, 2571 Shattuck Ave., Berkeley 4, Calif.—HL
Bogen Co., David, 663 Broadway, New York 12, N. Y.—HC, HD, HF, HL
Brite-Ray Television Co., 18 Clinton St., Brooklyn 2, N. Y.—HE
Brunswick Div., Radio & Television, Inc., 244 Madison Ave., New York 16, N. Y.—HC, HD, HE
Cadillac Electronic Corp., 19 W. 26th St., New York, N. Y.—HE
Calbest Engineering & Electronics Co., 828 N. Highland Ave., Hollywood 38, Calif.—HC, HE
Capehart-Farnsworth Corp., 3700 Pontiac St., Ft. Wayne 1, Ind.—HC, HD, HE
Cascade Television Co., 179 South St., Newark, N. J.—HE
CBS-Columbia, Inc., 170 53rd St., Brooklyn 32, N. Y.—HC, HD, HE
Certified Radio Laboratories, 5507 13th Ave., Brooklyn 19, N. Y.—HE
Clarke Instruments, 919 Jesup-Blair Drive, Silver Spring, Md.—HE, HG
Collins Audio Products Co., P. O. Box 368, Westfield, N. J.—HC, HD, HL
Communications Co., Inc., 300 Greco Ave., Coral Gables, Fla.—HA, HB, HF, HG, HL, HM
Communication Devices Co., 2331 12th Ave., New York 27, N. Y.—HH, HI
Conrac, Inc., 19217 E. Foothill Blvd., Glendora, Calif.—HE
Coronet Radio & Television Corp., 500 W. 52nd St., N. Y. 19, N. Y.—HC
Crosley Div., Avco Mfg. Corp., 1329 Arlington St., Cincinnati 25, Ohio—HC, HD, HE
Custom Craft Mfg. Co., 256 E. 98th St., Brooklyn 12, N. Y.—HL
Delco Radio Div., General Motors Corp., Kokomo, Ind.—HA, HB, HC, HD, HE, HF, HG
Designers for Industry, Inc., 2915 Detroit Ave., Cleveland 13, Ohio.—HA, HB, HL
DeWald Radio Mfg. Corp., 35-15 37th Ave., Long Island City, N. Y.—HC, HD, HE
Drake Co., R. L., 11 Longworth St., Dayton 2, Ohio—HF, HG, HH, HL, HM
DuMONT LABORATORIES, ALLEN B., 1000 Main Ave., Clifton, N. J.—HE
Eckstein Radio & Television Co., 3400 E. 42nd St., Minneapolis 6, Minn.—HC, HD
Edin Co., 207 Main St., Worcester 8, Mass.—HL, HM
Electronic Instrument Co., 276 Newport St., Brooklyn 12, N. Y.—HL, HM
Elm Laboratories, 18 S. Broadway, Dobbs Ferry, N. Y.—HH
Emerson Radio & Phonograph Corp., 111 Eighth Ave., New York 11, N. Y.—HC, HD, HE
Empire Radio, 125 E. 46th St., New York 17, N. Y.—HC, HD, HE
Engineering Associates, 434 Patterson Rd., Dayton 9, Ohio—HL
Erco Radio Laboratories, Stewart Ave. E., Garden City, L. I., N. Y.—HH, HI
Espey Mfg. Co., 528 E. 72nd St., New York 21, N. Y.—HC, HD
Fada Radio & Electric Co., 525 Main St., Belleville, N. J.—HC, HD, HE
FEDERAL TELEPHONE & RADIO CORP., 100 Kingsland Rd., Clifton, N. J.—HA, HF, HG
Ferrar Radio & Television Corp., 55 W. 26th St., New York 10, N. Y.—HC, HD
Fisher Radio Corp., 41 E. 47th St., New York, N. Y.—HC, HD, HE
Flush Wall Radio Co., 31 Clinton St., Newark 2, N. J.—HC
Freed Radio Corp., 200 Hudson St., New York 13, N. Y.—HC, HD, HE
Functional Music, Inc., 179 N. Michigan Ave., Chicago 1, Ill.—HL
GATES RADIO CO., Quincy, Ill.—HH
GENERAL ELECTRIC CO., ELECTRONICS DEPT., Syracuse, N. Y.—HC, HD, HE, HH, HI
Grem Engineering Co., 206 8th Ave., Brooklyn 15, N. Y.—HC, HD, HE
Hallicrafters Co., 4401 W. Fifth Ave., Chicago 24, Ill.—HC, HD, HE
Hammarlund Mfg. Co., 460 W. 34th St., New York 1, N. Y.—HF, HL
Harvey-Wells Electronics, Inc., North St., Southbridge, Mass.—HA, HB, HF, HG, HL, HM
Hastings Instrument Co., Super Highway & Pine Ave., Hampton, Va.—HL
Hoffman Radio Corp., 3761 S. Hill St., Los Angeles 7, Calif.—HC, HD, HE, HF, HG
Hudson American Corp., 25 W. 43rd St., New York 36, N. Y.—HC, HF
I.H.S. Co., 4721 N. Kedzie Ave., Chicago 25, Ill.—HE, HK
Industrial Television, Inc., 359 Lexington Ave., Clifton, N. J.—HE
Insuline Corp. of America, 36-02 35th Ave., Long Island City, N. Y.—HJ
International TV Corp., 238 William St., New York 7, N. Y.—HE
Intervox Corp., 1846 Westlake N., Seattle 9, Wash.—HF
Jackson Industries, Inc., 58 E. Cullerton St., Chicago 16, Ill.—HC, HD, HE
Jamaica Television Mfg. Co., 95-26 Sutphin Blvd., Jamaica 4, L. I., N. Y.—HE
Jewel Radio Corp., 10-40 45th Ave., Long Island City 1, N. Y.—HC, HD
JFD Manufacturing Co., 6127 16th Ave., Brooklyn 4, N. Y.—HJ
Kaye-Halbert Corp., 3623 Easthan Dr., Culver City, Calif.—HE
Kingston Radio Co., Kokomo, Ind.—HC, HD
Langevin Mfg. Corp., 37 W. 65th St., New York 23, N. Y.—HL
Link Radio Corp., 125 W. 17th St., New York, N. Y.—HD, HH, HI
Loral Electronics Corp., 794 E. 140th St., Bronx 54, N. Y.—HL
Lysco Mfg. Co., 82 Herman St., E. Rutherford, N. J.—HM
McLaughlin, J. L. A., 307 Bird Rock Ave., La Jolla, Calif.—HL
Magnavox Co., 2131 Bueter Rd., Ft. Wayne, Ind.—HC, HD, HE
Majestic Radio & Television Corp., 70 Washington St., Brooklyn 1, N. Y.—HC, HD, HE
Mattison Television & Radio Corp., 893 Broadway, New York 3, N. Y.—HC, HD, HE
Meck Industries, Plymouth, Ind.—HC, HD, HE
MELPAR, INC., 452 Swann Ave., Alexandria, Va.—HA, HB, HF, HG
Mitchell Mfg. Co., 2525 N. Clybourn Ave., Chicago, Ill.—HE
Modulation Products Co., 56 Lispenard St., New York 13, N. Y.—HH, HI
MOTOROLA, INC., 4545 Augusta Blvd., Chicago 51, Ill.—HC, HD, HE, HH, HI
MP Concert Installations, Fairfield 10, Conn.—HC, HE
Multiple Television Mfg. Co., 987 Hegeman Ave., Brooklyn 6, N. Y.—HE
National Aeronautical Corp., 180 S. Main St., Ambler, Pa.—HA, HB, HL
National Co., Inc., 61 Sherman St., Malden, Mass.—HE
Newcomb Audio Prods. Co., 6824 Lexington Ave., Hollywood 38, Calif.—HC
North American Phillips Co., 100 E. 42nd St., New York, N. Y.—HE

Olympic Radio & Television, Inc., 34-01 38th Ave., Long Island City 1, N. Y.—HC, HD, HE
Orthon Corp., 196 Albion Ave., Paterson 2, N. J.—HF, HG, HL, HM
Packard-Bell Co., 12333 W. Olympic Blvd., Los Angeles 64, Calif.—HC, HD, HE
Parts Producing Corp., Manhattan Div., 1861 Second Ave., New York 28, N. Y.—HL
Pathe Television Corp., 250 W. 57th St., New York 19, N. Y.—HE
Pearce Simpson, Inc., 2023 Coral Way, Miami 34, Fla.—HF
Peerless Television & Radio Co., 6508 Euclid Ave., Cleveland, Ohio—HC, HE
Pentron Corp., 221 E. Cullerton St., Chicago 16, Ill.—HC, HF
Philco Corp., Tioga & C Sts., Philadelphia 34, Pa.—HC, HD, HE, HH, HI, HL
Philharmonic Radio Co., 235 Jersey Ave., New Brunswick, N. J.—HC, HE
Pilot Radio Corp., 37-06 36th St., Long Island City, N. Y.—HC, HD, HE
POLARAD ELECTRONICS CORP., 100 Metropolitan Ave., Brooklyn 11, N. Y.—HL
Press Wireless Mfg. Co., Cantiague Rd., Hicksville, N. Y.—HA, HF, HL
Radio Apparatus Corp., 55 N. New Jersey St., Indianapolis 4, Ind.—HA, HF, HG, HL, HM
RADIO CORP. OF AMERICA, RCA-VICTOR DIV., Camden, N. J.—HC, HD, HE, HH, HI
Radio Craftsmen, Inc., 4401 N. Ravenswood Ave., Chicago 40, Ill.—HC, HD, HE
RADIO ENGINEERING LABORATORIES, INC., 36-40 37th St., Long Island City 1, N. Y.—HD, HG, HM
Radiomarine Corp. of America, 75 Varick St., New York 13, N. Y.—HF, HL
Radio Specialty Mfg. Co., 2023 E.S.E. 6th Ave., Portland 14, Ore.—HL
Raytheon Television, Belmont Radio Corp., 5921 W. Dickens St., Chicago 39, Ill.—HC, HD, HE
Regal Electronics, 603 W. 130th St., New York, N. Y.—HC, HD, HE
Rosen Engineering Prods., Inc., Raymond, 32nd & Walnut Sts., Philadelphia 4, Pa.—HL
Sargent-Rayment Co., 212 Ninth St., Oakland 7, Calif.—HC, HD, HL
SARKES TARZIAN, INC.—see **Tarzian, Inc., Sarkes**
Scott Radio Laboratories, 4541 Ravenswood Ave., Chicago, Ill.—HC, HD, HE
Sentinel Radio Corp., Evanston, Ill.—HC, HD, HE
Setchell Carlson, Inc., 330 Fifth Ave., New Brighton, Minn.—HC, HD, HE
Shevers, Inc., Harold, 123 W. 64th St., New York, N. Y.—HE
Sheraton Television Corp., 2061 Broadway, New York, N. Y.—HE
Sierra Electronic Corp., 1050 Brittan Ave., San Carlos, Calif.—HL
Silver Co., McMurdo, 417 Lafayette St., New York, N. Y.—HH, HI
Smith-Meeker Engineering Co., 157 Chambers St., New York City 7, N. Y.—HL
Snaider Television Corp., 540 Bushwick Ave., Brooklyn, N. Y.—HE
SNYDER MFG. CO., 22nd & Ontario Sts., Philadelphia, Pa.—HJ
Sonora Radio & Television Corp., 325 N. Hoyne Ave., Chicago 12, Ill.—HC, HD
Sparton Radio-Television, Jackson, Mich.—HC, HD, HE
Special Instruments Lab., Inc., 1003 Highland Ave., Knoxville, Tenn.—HB
SPERRY GYROSCOPE CO., DIV. SPERRY CORP., Great Neck, N. Y.—HL
Standard Coil Products Co., 2329 N. Pulaski Rd., Chicago 39, Ill.—HA, HB, HC, HK
Starrett Television Corp., 601 W. 26th St., New York, N. Y.—HC, HD, HE
Stewart-Warner Electric Co., 1300 N. Kastner Ave., Chicago 51, Ill.—HC, HD, HE
Steelman Phonograph & Radio Co., 12-30 Anderson Ave., Mount Vernon, N. Y.—HC
Stromberg-Carlson Co., 100 Carlson Rd., Rochester, N. Y.—HC, HD, HE
SYLVANIA ELECTRIC PRODUCTS INC., RADIO & TELEVISION DIV., 254 Rano St., Buffalo 7, N. Y.—HC, HD, HE
Symphonic Radio & Electronic Corp., 292 Main St., Cambridge 42, Mass.—HC
Symphony Radio & Television Corp., 825 W. Pico Blvd., Los Angeles 46, Calif.—HC, HD, HE
Taffet Radio & Television Co., 2530 Belmont Ave., New York 58, N. Y.—HH, HI
TARZIAN, INC., SARKES, 539 S. Walnut St., Bloomington, Ind.—HK
Tech-Master Products Co., 443 Broadway, New York 13, N. Y.—HE
TELECHROME, INC., 88 Merrick Rd., Amityville, L. I., N. Y.—HE, HL
Tele King Corp., 601 W. 26th St., New York, N. Y.—HC, HD, HE
TELEQUIP RADIO CO., 2559 W. 21st St., Chicago 8, Ill.—HE
Tele-Tone Radio Corp., Bayway Terminal, Elizabeth, N. J.—HE
Teletronics Laboratory, Inc., 352 Maple Ave., Westbury, L. I., N. Y.—HL
Telrex, Inc., Asbury Park 10, N. J.—HJ
Thordarson-Meissner Mfg. Div., 500 W. Huron St., Chicago 10, Ill.—HC, HD, HE
Trad Television Corp., Asbury Park, N. J.—HC, HD, HE
Transmitter Equip. Mfg. Co., 345 Hudson St., New York 14, N. Y.—HA, HB, HF, HG, HL
Trans-Vue Corp., 1139 S. Wabash Ave., Chicago 5, Ill.—HE
Trav-Ler Radio Corp., 571 W. Jackson Blvd., Chicago, Ill.—HC, HD, HE
Trio Mfg. Co., Griggsville, Ill.—HJ
Tru-Vue Television Co., 99 Featherbed Lane, Bronx 52, N. Y.—HE
U. S. Television Mfg. Corp., 3 W. 61st St., New York, N. Y.—HC, HD, HE
Univox Corp., 83 Murray St., New York 7, N. Y.—HB
Varian Associates, 99 Washington St., San Carlos, Calif.—HE
Video Corp. of America, 229 W. 28th St., New York, N. Y.—HC, HD, HE
Video Products Corp., 16 West St., Red Bank, N. J.—HE
Waveforms, Inc., 333 Sixth Ave., New York 14, N. Y.—HD, HL
Weingarten Electronic Laboratories, Inc., 7556 Melrose Ave., Los Angeles 46, Calif.—HC, HD, HL
Wells-Gardner & Co., 2701 N. Kildare Ave., Chicago, Ill.—HC, HD, HE
WESTINGHOUSE ELECTRIC CORP., HOME RADIO DIV., Sunbury, Pa.—HC, HD, HE
White Marine Radio Co., 122 Chambers St., New York 1, N. Y.—HF, HG
Zenith Radio Corp., 6001 W. Dickens Ave., Chicago 39, Ill.—HC, HD, HE

10—Color-TV

Adaptor, field sequential ..... GA
Adaptor, line & dot sequential ..... GB
Color signal generator ..... GC
Color tubes ..... GD
Control equipment ..... GE
Converter, field sequential ..... GF
Field camera ..... GG
Miscellaneous color accessories ..... GH
Receivers ..... GI
Studio camera ..... GJ
TV Film camera ..... GK

BERNDT-BACH, INC., AURICON DIV., 7325 Beverly Blvd., Los Angeles 36, Calif.—GK
CBS-Columbia, Inc., 170 53rd St., Brooklyn 32, N. Y.—GI
Celomat Corp., 54 W. 23rd St., New York City, N. Y.—GD, GF, GH
Color Sales Co., 675 W. Merrick Road, Lynbrook, L. I., N. Y.—GA, GF, GH
DuMONT LABORATORIES, ALLEN B., 1000 Main Ave., Clifton, N. J.—GC, GF, GG, GJ
Electronic Designs, Inc., 28 School St., Yonkers, N. Y.—GB
Electronic Instrument Co., 276 Newport St., Brooklyn 12, N. Y.—GA, GB, GC
FEDERAL TELECOMMUNICATION LABORATORIES, INC., 500 Washington Ave., Nutley 10, N. J.—GC, GH
Fidelity Tube Corp., 900 Passaic Ave., E. Newark, N. J.—GD
Fish-Schurman Corp., 70 Portman Rd., New Rochelle, N. Y.—GH
Flett Laboratory, 17 Madison Ave., Lansdowne, Pa.—GA, GD, GH, GK
Gray Research & Development Co., 16 Arbor St., Hartford, Conn.—GE, GF, GG, GH
Kaye-Halbert Corp., 3623 Eastman Drive, Culver City, Calif.—GI
Kliegl Bros., 321 W. 50th St., New York 19, N. Y.—GH
Lumenite Electronic Co., 407 S. Dearborn St., Chicago 5, Ill.—GE
Merix Chemical Co., 1021 E. 55th St., Chicago 15, Ill.—GH
National Union Radio Corp., 350 Scotland Rd., Orange, N. J.—GD
Orthon Corp., 196 Albion Ave., Paterson 2, N. J.—GA
Paillard Products, Inc., 265 Madison Ave., New York 16, N. Y.—GG
POLARAD ELECTRONICS CORP., 100 Metropolitan Ave., Brooklyn 11, N. Y.—GC, GE, GG, GJ
RADIO CORPORATION OF AMERICA, TUBE DEP'T., 415 S. 5th St., Harrison, N. J.—GC
RAULAND CORP., 4245 N. Knox Ave., Chicago 41, Ill.—GD
SARKES TARZIAN, INC., see Tarzian, Sarkes
Skiatron Electronic & Television Corp., 30 E. 10th St., New York 3, N. Y.—GE, GI
Sola Electric Co., 4633 W. 16th St., Chicago 50, Ill.—GE
TARZIAN, INC., SARKES, 539 S. Walnut St., Bloomington, Ind.—GD
TELECHROME, INC., 88 Merrick Rd., Amityville, L. I., N. Y.—GA, GB, GC, GE, GF, GH, GI, GK
Television Equipment Corp., 238 William St., New York 38, N. Y.—GA
UNIVERSAL AVIATION CORP., 230 Park Ave., New York 17, N. Y.—GE
Vacuum Tube Products, 506 S. Cleveland St., Oceanside, Calif.—GD

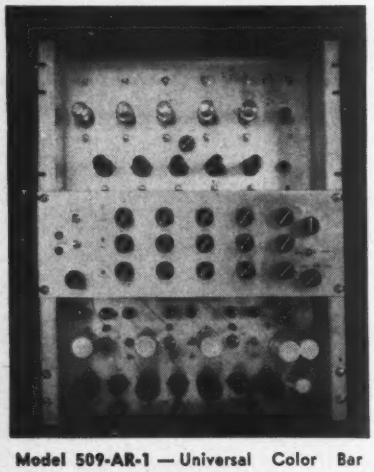
11—Monitors

Antenna phase ..... WA
Audio ..... WB
Frequency ..... WC
Modulation ..... WD
Service ..... WE
Video line ..... WF
Video off-the-air ..... WG
Waveform ..... WH

American Communications Corp., 306 Broadway, New York, N.Y.—WB
ANDREW CORP., 363 E. 75th St., Chicago 19, Ill.—WA
Berkeley Scientific Corp., 2200 Wright Ave., Richmond, Calif.—WC
Browning Laboratories, Inc., 750 Main St., Winchester, Mass.—WC, WD
Brush Development Co., 3405 Perkins Ave., Cleveland 14, Ohio—WD
Burnett Radio Laboratory, Wm. W. L., 4814 Idaho St., San Diego 16, Calif.—WE

New!

UNIVERSAL
COLOR BAR
PATTERN GENERATOR



Model 509-AR-1 — Universal Color Bar Pattern Generator

SEE front cover pictures and article in another electronics magazine, August 1951

This equipment is usable for any past, present or future TV color system, since it generates 3 simultaneous color signals without noise.

These color signals may be combined in any manner desired for CBS—RCA—Hazeltine or any contemplated or proposed TV system.

The hue, brightness and saturation of the colors may be varied over a wider gamut than any present printing process known. This is achieved by 15 controls which allow independent settings of the colors of the bars produced.

Any video signal may be fed into this bar generator and color will be mixed with it.

Levels independently adjustable for either color or monochrome.

This equipment is far more economical than, and will replace, a flying spot scanner for generating standard color signals.

Write for our color catalog

TELECHROME *Incorporated*

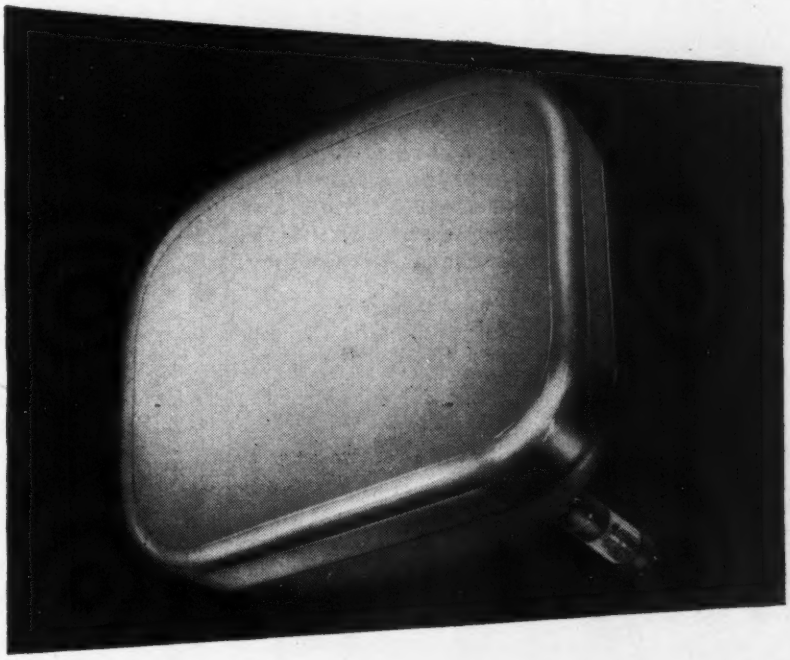
84 Merrick Road, Amityville, L. I., N. Y. — Phone AMityville 4-4446

TV

Transmitters
Microwave Links and Relays
Transmitting Antennas
Lead-in Cables
Receivers—*The Incomparable Capehart!*
Power Supplies—Selenium Rectifiers

and

NEW LONG LIFE TV PICTURE TUBES



...all from IT&T

A pioneer in television, International Telephone and Telegraph Corporation provides unusual engineering facilities, as well as special equipment, for the design and installation of television broadcasting stations.

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Export Distributor—International Standard Electric Corporation, 67 Broad Street, New York, N. Y.
U. S. Manufacturing Associates—*Federal Telephone and Radio Corporation* and *Capehart-Farnsworth Corporation*

Clarke Instruments, 919 Jesup-Blair Dr., Silver Spring, Md.—WA, WG
Coax Electronics Co., 1524 E. 15 St., Brooklyn 30, N.Y. —WB
Commercial Radio Monitoring Co., P. O. Box 7037, Kansas City, Mo.—WE
Communication Products Co., Marlboro, N. J.—WF
Doolittle Radio Inc., 7421 Loomis Blvd., Chicago, Ill.— —WC, WD
DuMONT LABORATORIES, Allen B., 1000 Main Ave., Clifton, N. J.—WC, WD, WF, WG, WH
Fairchild Recording Equipment Corp., 154 St. & 7th Ave., Whitestone, N.Y.—WG
FEDERAL TELECOMMUNICATION LABORATORIES, INC., 500 Washington Ave., Nutley 10, N. J.—WB, WC, WD, WF, WG, WH
GATES RADIO CO., Quincy, Ill.—WA, WC, WD
GENERAL ELECTRIC CO., ELECTRONICS DEPT., Syracuse, N. Y.—WA, WC, WD, WF, WG
GENERAL PRECISION LABORATORIES, INC., 63 Bedford Rd., Pleasantville, N. Y.—WF, WG, WH
General Radio Co., 275 Massachusetts Ave., Cambridge 39, Mass.—WC, WD
Gray Research & Development Co., 16 Arbor St., Hartford, Conn.—WF
Hazeltine Electronics Corp., 58-25 Little Neck Pkwy., Little Neck, L.I., N.Y.—WD
HEWLETT-PACKARD CO., 395 Page Mill Rd., Palo Alto, Calif.—WC, WD
Holl Audio Industries, 9215 Venice Blvd., Los Angeles 34, —WB
Industrial Television, Inc., 359 Lexington Ave., Clifton, N.J.—WF, WG
Jamaica Television Mfg. Co., 95-26 Sutphin Blvd., Jamaica 4, L. I., N. Y.—WE, WF
Kings Microwave Co., 50 Marbledale Rd., Tuckahoe, N.Y.—WA
Lampkin Laboratories, Inc., Bradenton, Fla.—WC, WD
Langevin Mfg. Corp., 37 W. 65 St., New York 23, N.Y. —WB
Link Radio Corp., 125 W. 17 St., New York 11, N.Y.— WC, WD
Marconi Instruments, Ltd., 23 Beaver St., New York, N.Y. —WC, WD
MOTOROLA, INC., 4545 Augusta Blvd., Chicago 51, Ill. —WC, WD
National-Simplex-Bludworth, Inc., 92 Gold St., New York 7, N.Y.—WG
Panoramic Radio Products, Inc., 10 S. 2nd Ave., Mt. Vernon, N.Y.—WD
Philco Corp., Tioga & C Sts., Philadelphia 34, Pa.—WF
POLARAD ELECTRONICS CORP., 100 Metropolitan Ave., Brooklyn 11, N. Y.—WF, WH
Potter Instrument Co., 115 Cutter Mill Rd., Great Neck, L.I., N.Y.—WC
Press Wireless Mfg. Co., Cantiague Rd., Hicksville, N.Y. —WC
RADIO CORP. OF AMERICA, RCA-VICTOR DIV., Camden, N. J.—WA, WC, WD, WF, WG
Radio-Music Corp., 84 S. Water St., Port Chester, N.Y. —WB
Reeves-Hoffman Corp., 321 Cherry St., Carlisle, Pa.—WC
REEVES SOUNDCRAFT CORP., 10 E. 52nd St., New York 22, N. Y.—WE, WG
Republic Television, Inc., 7 E. Madison Ave., Dumont, N.J.—WF
Rowe Industries, 1702 Wayne St., Toledo 9, Ohio—WA, WB
SPERRY GYROSCOPE CO., Great Neck, N. Y.—WC
SYLVANIA ELECTRIC PRODUCTS CO., 1740 Broadway, N. Y.—WF, WG, WH
TELECHROME, INC., 88 Merrick Rd., Amityville, L. I., N. Y.—WF, WG, MH
Telectro Industries Corp., 35-16 37th St., Long Island City 1, N.Y.—WB
Television Utilities Corp., 1261 Broadway, New York 1, N.Y.—WB, WE, WF, WG
Waveforms Inc., 333 Sixth Ave., New York 14, N.Y.— WB
Western Sound & Electric Labs., Inc., 805 S. 5th St., Milwaukee 4, Wisc.—WB
Weymouth Instrument Co., 1440 Commercial St., E. Weymouth 89, Mass.—WC

Floating Action! for all TV Cameras

"BALANCED" TV TRIPOD

Pat. Pending

This tripod was engineered and designed expressly to meet all video camera requirements. Previous concepts of gyro and friction type design have been discarded to achieve absolute balance, effortless operation, super-smooth tilt and pan action, dependability, ruggedness & efficiency.

Below:

3-wheel portable dolly with balanced TV Tripod mounted.

Complete 360° pan without ragged or jerky movement is acomplished with effortless control. It is impossible to get anything but perfectly smooth pan and tilt action with the "BALANCED" TV Tripod.

Quick-release pan handle adjustment locks into position desired by operator with no "play" between pan handle and tripod head. Tripod head mechanism is rustproof, completely enclosed, never requires adjustments, cleaning or lubrication. Built-in spirit level. Telescoping extension pan handle.

Write to Dept. T for further particulars

CAMERA EQUIPMENT CO.
1600 BROADWAY NEW YORK CITY

STUDIO EQUIPMENT

12—Video

Accessories ..... KA
Amplifiers, distribution ..... KB
Amplifiers, stabilizing ..... KC
Attenuators ..... KD
Cameras ..... KE
Camera controls ..... KF
Camera cranes ..... KG
Camera dollies ..... KH
Camera switching system ..... KI
Camera turrets ..... KAI
Consoles, control ..... KJ
Consoles, remote switching ..... KK
Distribution & mixing squipment ..... KL
Distribution system, TV, RF ..... KM
Flying spot scanner ..... KN
Lenses ..... KO
Line & program monitors ..... KP
Master control ..... KQ
Montage amplifiers ..... KR
Multiplexers ..... KAJ
Patch cords ..... KS
Power supplies ..... KT
Projection units ..... KU
Reflectors ..... KAH
Special effects equipment ..... KV
Sync. generators ..... KW
Sync. stretchers ..... KX
Tripods ..... KY
TV film cameras ..... KZ
TV film camera controls ..... KAA
TV projectors
- **Film** ..... KAB
- **Kaleidoscope** ..... KAC
- **Rear screen** ..... KAD
- **Slide** ..... KAE
- **Special purpose** ..... KAF

Video patch panels ..... KAG

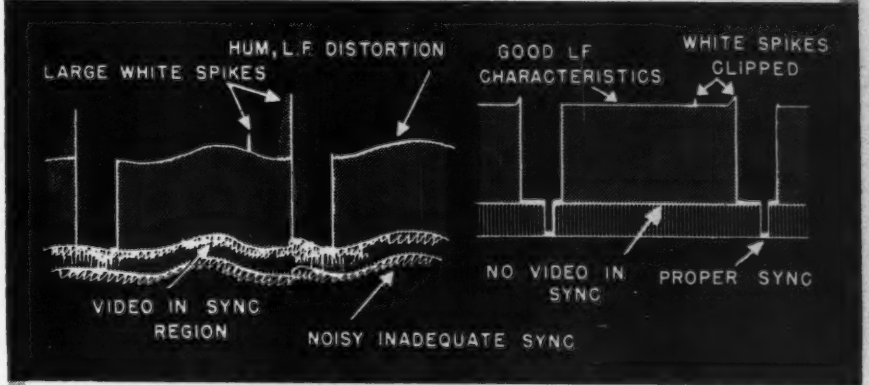
Accurate Engineering Co., 2005 Blue Island Ave., Chicago 8, Ill.—KT
Ace Electric Mfg. Co., 1458 Shakespeare Ave., Bronx 52, N. Y.—KU
Affiliated Photographic Co., 21 W. 45th St., New York 19, N. Y.—KAE
Akeley Camera & Instrument Corp., 175 Varick St., New York 14, N. Y.—KE, KF, KG, KH, KI, KK, KO, KY
American Electroneering Co., 5025-15 W. Jefferson Blvd., Los Angeles 16, Calif.—KB, KC, KL, KT
American Television, Inc., 523 S. Plymouth Ct., Chicago 5, Ill.—KB, KL, KN, KT, KW, KAG
American Television & Radio Co., 300 E. 4th St., St. Paul 1, Minn.—KT
Amplifier Corp. of America, 398 Broadway, New York 13, N. Y.—KB, KC, KT
Back Video Corp., F. G., 500 Fifth Ave., New York 18, N. Y.—KO
Bausch & Lomb Optical Co., 635 St. Paul St., Rochester 2, N. Y.—KO
BELL & HOWELL CO., 7100 McCormick Rd., Chicago 45, Ill.—KO
BERNDT-BACH, INC., AURICON DIV., 7325 Beverly Blvd., Los Angeles 36, Calif.—KY, KZ, KAA
Beta Electric Corp., 333 E. 103rd St., New York 29, N. Y.—KT, KU
Brociner Electronics Laboratory, 1546 Second Ave., New York 28, N. Y.—KB
Brumberger Sales Corp., 34 34th St., Brooklyn 32, N. Y. —KA, KAE
Buhl Optical Co., 1009 Beech Ave., Pittsburgh 12, Pa. —KO
Burke & James, 233 W. Madison St., Chicago, Ill.—KO
CAMERA EQUIPMENT CO., 1600 Broadway, New York 19, N. Y.—KG, KH, KO, KU, KY
Cinema Engineering Co., 1510 W. Verdugo Ave., Burbank, Calif.—KJ, KK, KL, KP
Clarke Instruments, 919 Jesup-Blair Dr., Silver Spring, Md.—KS, KAG
Clarostat Mfg. Co., Washington St., Dover, N. H.—KD
Coil Winders, Inc., 61 Bergen St., Brooklyn 2, N. Y.— KA, KS, KT
Coax Electronics Co., 1524 E. 15th St., Brooklyn 20, N. Y.—KJ
Compo Corp., 2251 W. St. Paul Ave., Chicago 47, Ill. —KA

Connecticut Telephone & Electric Corp., 70 Britannia St., Meriden, Conn.—KS, KT
Cornell-Dubilier Electric Corp., 333 Hamilton Blvd., South Plainfield, N. J.—KT
Da-Lite Screen Co., 2711 N. Pulaski Rd., Chicago 39, Ill. KA, KY
Daven Co., 191 Central Ave., Newark 4, N. J.—KA, KD, KI, KL
Display Lighting Co., 417 E. 61st St., New York 21, N. Y.—KF, KH, KO, KY
DuMONT LABS., INC., ALLEN B., 100 Main Ave., Clifton, N. J.—KA, KB, KC, KD, KE, KF, KG, KH, KI, KJ, KK, KL, KM, KN, KO, KP, KQ, KR, KS, KT, KU, KV, KW, KX, KY, KZ, KAA, KAB, KAD, KAE, KAF, KAG
Eastman Kodak Co., 343 State St., Rochester 4, N. Y. —KO
Eicor, Inc., 1501 W. Congress St., Chicago 7, Ill.—KT
Electrodyne Co., 32 Oliver St., Boston 10, Mass.—KT
Electronic Measurements Co., Box 850, Red Bank, N. J. —KT, KW
FEDERAL TELECOMMUNICATION LABORATORIES, 500 Washington Ave., Nutley 10, N. J.—KA, KB, KC, KD, KE, KF, KG, KH, KI, KJ, KL, KM, KN, KO, KP, KQ, KR, KS, KT, KU, KW, KX, KY, KZ, KAA, KAB, KAD, KAE, KAF, KAG
Film Research Associates, 150 E. 52nd St., New York 33, N. Y.—KAE, KAF
Fish-Schurman Corp., 70 Portman Rd., New Rochelle, N. Y.—KA, KE, KO, KAE
Flett Laboratory, 17 Madison Ave., Lansdowne, Pa.—KF, KH, KN, KU, KAA, KAE, KAF
Furst Electronics, 12 S. Jefferson St., Chicago 6, Ill.—KT
Gale Dorothea Mechanisms, 81-01 Broadway, Elmhurst, L. I., N. Y.—KU, KV, KAE, KAF
General Cement Mfg. Co., 919 Taylor Ave., Rockford, Ill.—KA
GENERAL ELECTRIC CO., ELECTRONICS DEPT., Syracuse, N. Y.—KA, KB, KC, KE, KF, KG, KH, KI, KJ, KK, KQ, KL, KO, KP, KT, KW, KX, KY
GENERAL PRECISION LABORATORIES, INC., 63 Bedford Rd., Pleasantville, N. Y.—KA, KB, KC, KD, KE, KF, KG, KH, KI, KJ, KK, KL, KM, KN, KO, KP, KQ, KS, KT, KU, KV, KW, KX, KY, KZ, KAA, KAB, KAC, KAD, KAE, KAF, KAG
Golde Mfg. Co., 1214 W. Madison St., Chicago 17, Ill.—KAB, KAD, KAE, KAF
Goslin Electric & Mfg. Co., 2921 W. Olive Ave., Burbank, Calif.—KT
Gray Research & Development Co., 16 Arbor St., Hartford, 1, Conn.—KU, KV, KAE, KAF, KAI, KAJ
Gulton Mfg. Corp., 212 Durham Ave., Metuchen, N. J. —KB, KC
Gundlach Mfg. Corp., Fairport, N. Y.—KO
Hamilton Electronics, 2726 Pratt Ave., Chicago 45, Ill. —KT
Highland Engineering Co., Main & Urban Sts., Westbury, N. Y.—KB, KC, KT
Holub Industries, Inc., Sycamore, Ill.—KA, KT
HOUSTON-FEARLESS CORP., 11801 W. Olympic Blvd., W. Los Angeles 64, Calif.—KG, KH, KY
Imperial Chemical Industries, 521 Fifth Ave., New York 17, N. Y.—KU
Inductograph Products, Inc., 236 W. 55th St., New York 19, N. Y.—KT
Industrial Television, Inc., 359 Lexington Ave., Clifton, N. J.—KP
Insuline Corp. of America, 3602 35th Ave., Long Island City 1, N. Y.—KA
J. & A. Television & Mfg. Co., 5656 Broadway, Chicago 40, Ill.—KW
Jamaica Television Mfg. Co., 95-26 Sutphin Blvd., Jamaica 4, L. I., N. Y.—KE, KI, KJ, KK, KP, KQ, KW, KX
Kepco Laboratories, Inc., 149-14 41st Ave., Flushing 55, N. Y.—KT
Kliegl Bros., 321 W. 50th St., New York 19, N. Y.—KV, KAD, KAE, KAG
Kollmorgen Optical Corp., 2 Franklin Ave., Brooklyn 11, N. Y.—KO
Lambda Electronics Corp., 103-02 Northern Blvd., Corona 68, N. Y.—KT
Libra Film Distributors, 6525 Sunset Blvd., Hollywood 28, Calif.—KE, KH, KY
Maurer, Inc., J. A., 37-01 31st St., Long Island City 1, N. Y.—KZ
Merix Chemical Co., 1021 E. 55th St., Chicago 15, Ill. —KA
Micro Engineering Corp., 15 E. Tujunga Ave., Burbank, Calif.—KE, KG, KH, KN, KY
Midco Mfg. Co., 607 No. 8th St., Sheboygan, Wisc.—KT
Millen Mfg. Co., James, 150 Exchange St., Malden 48, Mass.—KT
Minnesota Electronics Corp., 47 W. Water St., St. Paul 1, Minn.—KB
Movie-Mite Corp., 1105 Truman Rd., Kansas City 6, Mo. —KU
National Cine Equip., Inc., 20 W. 22nd St., New York 10, N. Y.—KF, KG, KH, KO, KY
North American Electric Lamp Co., 1014 Tyler St., St. Louis 6, Mo.—KU
North American Philips Co., 100 E. 42nd St., New York, N. Y.—KU
O'Brien Electric Co., 5326 Sunset Blvd., Hollywood 27, Calif.—KK
Opad-Green Co., 71 Warren St., New York 7, N. Y.—KT
Orthon Corp., 196 Albion Ave., Paterson 2, N. J.—KS, KAG
Paillard Products, Inc., 265 Madison Ave., New York 16, N. Y.—KE
Pancro Mirrors, Inc., 2958 Los Feliz Blvd., Los Angeles 39, Calif.—KAH
Perkin-Elmer Corp., Main Ave., Norwalk, Conn.—KO
Philco Corp., Tioga & C Sts., Philadelphia 34, Pa.—KN

Facts— YOU SHOULD KNOW ABOUT

GENERAL ELECTRIC STABILIZING AMPLIFIER TYPE TV-16-B

Input and Output — No other stabilizing amplifier gives you a choice of matching or bridging input with an input gain for both. This unit provides *two* standard RTMA outputs. One of these can be used for monitoring—with as much as 37 db of isolation between monitor output and picture output.



Vertical Wave Form — Output level control can be adjusted while maintaining critical circuits at a constant signal level. This effectively increases the range of input variation over which the amplifier will maintain stability.

White Clipper—A unique General Electric feature that guards against overloads due to "whites". It may also be used as a guard against buzz in intercarrier type receivers.

Automatic Correction of the sync and blanking portion of the television signal, adjustable sync percentage, and improved LF characteristics are the important benefits available with G.E.'s new Stabilizing Amplifier.

FREE— Handy leatherette folder containing specification bulletins of all General Electric TV Station equipment will be forwarded on request to television station managers and engineers. Write: *General Electric Company, Section 4891, Electronics Park, Syracuse, New York.*

GENERAL ELECTRIC

Polarad
Electronics Corporation

PRECISION LABORATORY INSTRUMENTS

Model LSA

the instrument consists of the following units:

Model LTU-1 R.F. Tuning Unit—10 to 1000 MC.
Model LTU-2 R.F. Tuning Unit—940 to 4500 MC.
Model LTU-3 R.F. Tuning Unit—4460 to 16,520 MC.
Model LDU-1 Spectrum Display Unit.
Model LPU-1 Power Unit.
Model LKU-1 Klystron Power Unit.

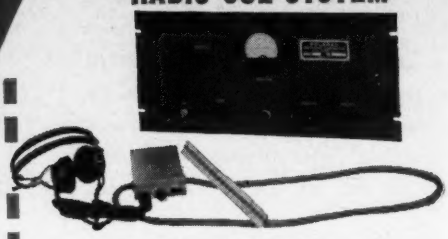
MICROWAVE SIGNAL SOURCES

Models SSR, SSL, SSS, SSM, SSX
634 MC to 11,000 MC

For use as a reliable source of microwave energy in transmission loss measurements, standing wave determination, etc. Unidial Control for accuracy and ease of operation. Direct reading (no mode charts to consult). Frequency determination accurate to 1% through use of present calibration and temperature compensated klystrons.

Five Microwave Signal Sources are available to cover the frequency range from 634 MC to 11,000 MC. Units ruggedly constructed, mounted on aluminum castings to insure mechanical stability. Klystron reflector voltage automatically tracked with tuning of the klystron cavity to provide unidial control. Signal sources supplied complete with klystron.

RADIO CUE SYSTEM



Model AB

Used to direct the activities of persons within a limited area from a central control point. Widely used in broadcast and motion picture studios (sound and television). Ideal for factories, yards, hangars, airports, auditoriums, and places where the noise level is high. The Radio Cue System permits efficient operation under difficult conditions.

Pocket size receivers worn by radio directed personnel are small and light in weight assuring complete freedom of movement. Simultaneous transmission on two or more communication channels. System is portable and may be installed rapidly because of its unusual simplicity.

REGULATED POWER UNITS

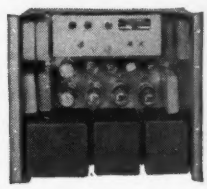
Electronically regulated power supplies designed to meet the needs of television equipment and other apparatus which require extremely fine regulation, low ripple content and appreciable quantities of D.C. power.

Output impedance less than 1.5 ohms.
Regulation better than 0.2%.

The power supplies are built on a dishpan type chassis with transformers, tubes and control panel at the front. All wiring is on the rear of the chassis which is of standard rack width. To insure long life, no electrolytic condensers are used.

A portable carrying case, Model C111, is available.

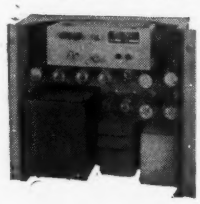
Model PT111



Consists of a positive and a negative voltage supply independently regulated.

Output Voltage: 250-300 volts D.C.
Output Current: 100-400 ma.

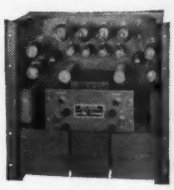
Model PT112



Heavy duty electronically regulated D.C. power source.

Output Voltage: 250-300 volts, D.C.
Output Current: 150-800 ma.

Model PT111D
(Dual Regulated)



Consists of two independently regulated D.C. power sources, (isolated from ground), mounted on one chassis. Each power source has its own power switch, fuse, pilot light and voltage control. Each power supply can be operated with negative or positive ground.

(Each power source, two such sources available)
Output Voltage: 250-300 volts, D.C.
Output Current: 100-400 ma.

all band, direct reading

SPECTRUM ANALYZER

10 MC to 16,520 MC

The Model LSA is the result of years of research and development. It provides a simple and direct means of rapid and accurate measurement and spectral display of an rf signal.

Outstanding Features:

- Continuous tuning.
- One tuning control.
- 5 KC resolution at all frequencies.
- 250 KC to 25 MC display at all frequencies.
- Tuning dial frequency accuracy 1 percent.
- No Klystron modes to set.
- Broadband attenuators supplied with equipment above 1000 MC.
- Frequency marker for measuring frequency differences 0-25 MC.
- Only three tuning units required to cover entire range.
- Microwave components use latest design non-contacting shorts for long mechanical life.
- Maximum frequency coverage per dollar invested. 5 inch CRT display.

Where Used:

Polarad's Model LSA Spectrum Analyzer is a laboratory instrument used to provide a visual indication of the frequency of distribution of energy in an rf. signal in the range 10 to 16,520 MC.

Other uses are:

1. Observe and measure sidebands associated with amplitude and frequency modulated signals.
2. Determine the presence and accurately measure the frequency of radio and/or radar signals.
3. Check the spectrum of magnetron oscillators.
4. Measures noise spectra.
5. Check and observe tracking of rf. components of a radar system.
6. Check two rf. signals differing by a small frequency separation.

WIDE BAND VIDEO AMPLIFIER

Model V 100 CPS to 20 MC

Designed for use as an oscilloscope deflection amplifier for the measurement and viewing of pulses of extremely short duration and rise time. Supplied complete with Video Amplifier Unit, Power Unit and Low Capacity Probe.

Features:

- Flat frequency response from 100 cps to 20 mc ± 1.5 db.
- Uniform time delay of .02 microseconds.
- Pulse rise of 0.02 μs with minimum overshoot.
- Gain of 50 db.
- Frequency compensated high impedance attenuator calibrated in 10 db steps from 0-50.
- Fine attenuator covers a 10 db range.
- Phase Linear with frequency over entire band.

Model V

Manufacturers of precision laboratory instruments

POLARAD ELECTRONICS CORP., 100 Metropolitan Ave., Brooklyn 11, N. Y.

POLARAD ELECTRONICS CORP., 100 Metropolitan Ave., Brooklyn 11, N. Y.—KB, KE, KF, KI, KJ, KK, KL, KP, KQ, KT, KW, KZ
Precision Products, Inc., 719 17th St., N.W., Washington, D. C.—KE, KO
Premier Electronic Lab., 382 Lafayette St., New York 3, N. Y.—KW
Radiant Specialty Co., 1225 S. Tallman Ave., Chicago, Ill. —KY
RADIO CORP. OF AMERICA, RCA-VICTOR DIV., Camden, N. J.—KA, KB, KC, KE, KF, KG, KH, KI, KJ, KK, KL, KO, KP, KQ, KT, KU, KW, KX, KY
Radio Supply & Engineering Co., 85 Selden Ave., Detroit 1, Mich.—KA, KB, KC, KE, KI
Ram Electronics, Inc., Buckhout St., Irvington, N. Y.— KT
REEVES SOUNDCRAFT CORP., 35-54 36th St., Long Island City 6, N. Y.—KU
Republic Lens Co., 916 Ninth Ave., New York 19, N. Y. —KO
Runzel Cord & Wire Co., 4727 Montrose Ave., Chicago 41, Ill.—KS
Saftee Glass Co., 4717 Stenton Ave., Philadelphia 44, Pa. —KO
SARKES TARZIAN, INC., see Tarzian, Sarkes
Shallcross Mfg. Co., Jackson & Pusey Aves., Collingdale, Pa.—KD
Sierra Electronic Corp., 1050 Brittan Ave., San Carlos, Calif.—KT
Skiatron Corp., 30 E. 10th St., New York, N. Y.—KN, KR, KV
S. O. S. CINEMA SUPPLY CORP., 602 W. 52nd St., New York 19, N. Y.—KU, KZ, KAD
Spellman Television Corp., 3029 Webster Ave., New York 67, N. Y.—KO, KT
Spencer-Kennedy Laboratories, Inc., 186 Massachusetts Ave., Cambridge 39, Mass.—KB, KM
Stoddart Aircraft Radio Co., 6644 Santa Monica Blvd., Hollywood 38, Calif.—KD
TARZIAN, INC., SARKES, 539 S. Walnut St., Bloomington, Ind.—KJ, KK, KQ
Tech Laboratories, Inc., Bergen & Edsall Blvds., Palisades Park, N. J.—KD, KQ, KV
TELECHROME, INC., 88 Merrick Rd., Amityville, L. I., N. Y.—KA, KB, KI, KL, KM, KN, KO, KP, KR, KT, KU, KV, KW, KX, KZ, KAG
Telectro Industries Corp., 35-16 37th St., Long Island City 1, N. Y.—KT
TELEQUIP RADIO CO., 2259 W. 21st St., Chicago 8, Ill. —KW
Television Equipment Corp., 238 William St., New York 38, N. Y.—KE, KF
Television Utilities Corp., 1261 Broadway, New York 1, N. Y.—KP
Television Zoomar Corp., 500 Fifth Ave., New York 18, N. Y.—KO
Tel-Instrument Co., 50 Paterson Ave., E. Rutherford, N. J. —KB, KW
Thordarson-Meissner Mfg. Div., Maguire Industries, Inc., 500 W. Huron St., Chicago 10, Ill.—KT
Trans-Lux Corp., 1270 6th Ave., New York, N. Y.— KA, KO
Tressel Television Prod., Inc., 11 S. LaSalle St., Chicago 3, Ill.—KAE, KAF
Trimm, Inc., 400 West Lake St., Libertyville, Ill.—KS
UNIVERSAL AVIATION CORP., 230 Park Ave., New York 17, N. Y.—KJ, KK
VICTORLITE INDUSTRIES, INC., 5350 Second Ave., Los Angeles 43, Calif.—KU, KV, KAD, KAF
Viewlex, Inc., 35-01 Queens Blvd., Long Island City 4, N. Y.—KO
Warren Mfg. Co., 250 East St., New Haven, Conn.—KA
Western Sound & Electric Labs., 805 S. 5th St., Milwaukee, Wisc.—KB, KJ, KL
Weston Laboratories, 410 Glen Rd., Weston 93, Mass.— KT
Williams, Brown & Earle, Inc., 918 Chestnut St., Philadelphia 7, Pa.—KZ, KAA, KAB, KAD, KAE, KAF
Winslow Co., 9 Liberty St., Newark 5, N. J.—KA
Zenith Optical Laboratory, 1940 Great Neck Rd., Copiague, N. Y.—KO

13—*Lighting*

Accessories & supplies ..... LA
Arc spotlights ..... LN
Black lights ..... LB
Control console LC
Dimmers ..... LD
Fluorescent ..... LE
Fluorescent pigment ..... LF
Gobos ..... LG
Incandescent ..... LH
Inkie spotlights ..... LQ
Light meters LI
Mercury arc ..... LJ
Pilot lights ..... LO
Portable lighting kits ..... LK
Power supplies LL
Studio rigging ..... LM

Accurate Engineering Co., 2005 Blue Island Ave., Chicago 8, Ill.—LL
Adam Electric Co., Frank, 3650 Windsor Pl., St. Louis, Mo.—LD
Adams Lighting Co., 48 W. 27th St., New York 1, N. Y. —LE, LH
Advance Transformer Co., 1122 W. Catalpa Ave., Chicago 40, Ill.—LA

NEW TV AND STUDIO VISUAL PROJECTOR
VISUAL CAST

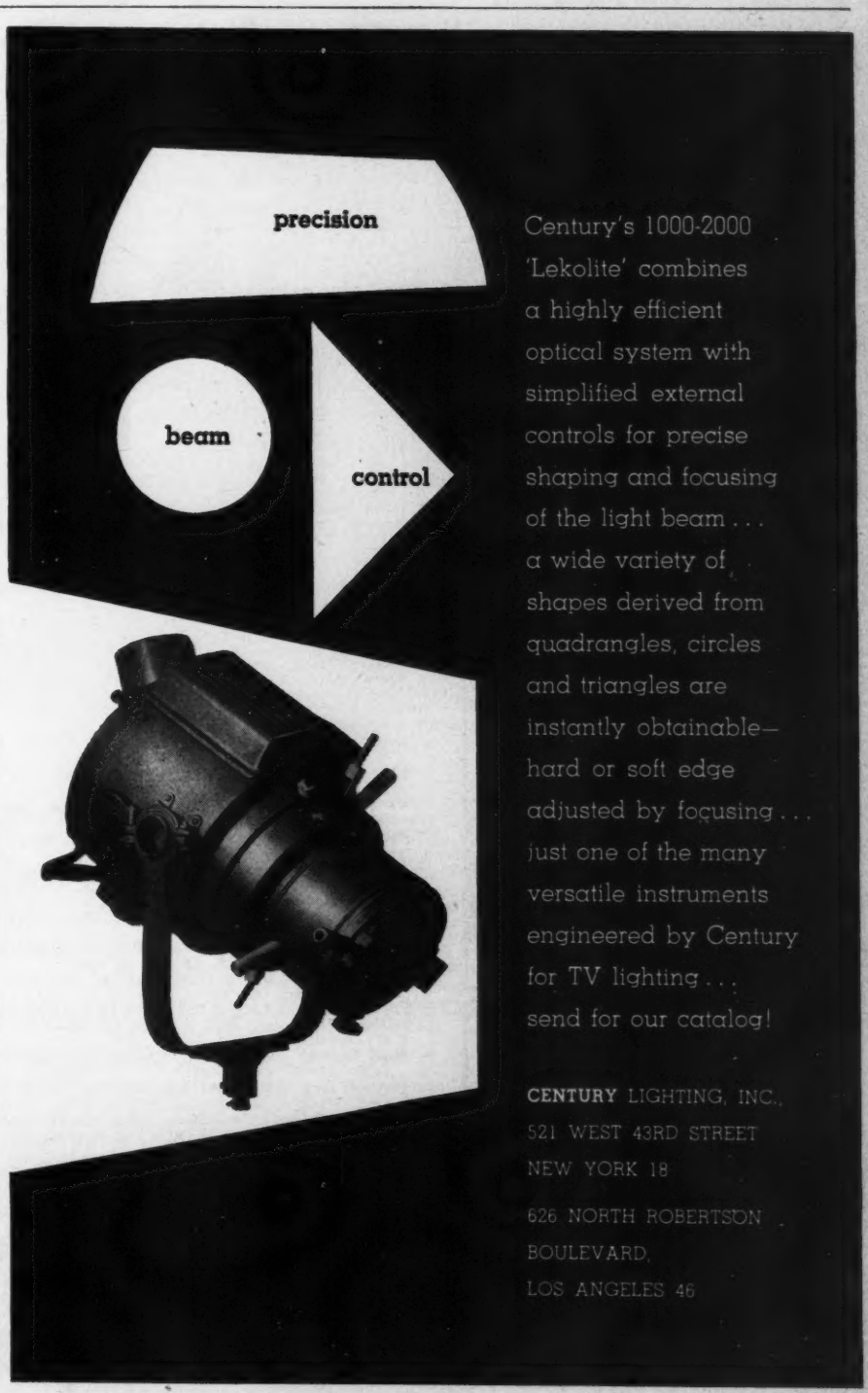
SAVE ON PRODUCTION OVERHEAD AND INCREASE YOUR FACILITIES

THE **NEW** TELEVISION MODEL AFFORDS YOU MANY USES

- Allows Audience Participation
- Cartooning
- Cues Actors
- Children's Shows
- Background Projection

For Further Information Write

VICTORLITE INDUSTRIES, INC.
5350 SECOND AVENUE
Los Angeles 43 California



Century's 1000-2000 'Lekolite' combines a highly efficient optical system with simplified external controls for precise shaping and focusing of the light beam . . . a wide variety of shapes derived from quadrangles, circles and triangles are instantly obtainable—hard or soft edge adjusted by focusing . . . just one of the many versatile instruments engineered by Century for TV lighting . . . send for our catalog!

CENTURY LIGHTING, INC.,
521 WEST 43RD STREET
NEW YORK 18

626 NORTH ROBERTSON BOULEVARD,
LOS ANGELES 46

Auricon
16mm Sound-On-Film
RECORDING EQUIPMENT
for
TELEVISION FILM
PRODUCTION

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Aerolux Light Corp., 653 Eleventh Ave., New York 19, N. Y.—LB, LE, LH, LJ, LK
Art Specialty Co., 3245 W. Lake St., Chicago 24, Ill.—LA, LE, LH, LK
Back Video Corp., F. G., 500 Fifth Ave., New York 18, N. Y.—LE, LI
Beeland Co., Charles D., Walton Bldg., Atlanta 3, Ga.—LA, LH
Beta Electric Corp., 333 E. 103rd St., New York 29, N. Y.—LL
Black Light Products, 67 E. Lake St., Chicago 1, Ill.—LB, LF
Brenkert Light Projection Co., 6545 St. Antoine St., Detroit, Mich.—LH
CAMERA EQUIPMENT CO., 1600 Broadway, New York 19, N. Y.—LA, LI, LH, LK
CANNON ELECTRIC CO., 3209 Humboldt St., Los Angeles 31, Calif.—LO
Capitol Stage Lighting Co., 527 W. 45th St., New York 19, N. Y.—LA, LC, LD, LE, LH, LK, LM
CENTURY LIGHTING, 521 W. 43rd St., New York 18, N. Y.—LA, LC, LD, LE, LH, LM, LN
Color Tran Converter Co., 7045 Romaine, Hollywood 38, Calif.—LA, LC, LD, LG, LH, LK, LL
Compco Corp., 2251 W. St. Paul Ave., Chicago 47, Ill. LA, LE, LH
Curtis Lighting Inc., 6135 W. 65th St., Chicago 38, Ill.—LE, LH
Cutler-Hammer, Inc., 411 N. 12th St., Milwaukee, Wisc.—LD
Dallons Laboratories, 5066 Santa Monica Blvd., Los Angeles 27, Calif.—LB, LJ
Dial Light Co. of America Inc., 900 Broadway, New York 3, N. Y.—LD, LO
Display Lighting Inc., 417 E. 61st St., New York 21, N. Y.— LA, LD, LG, LH, LM
Drake Mfg. Co., 1713 W. Hubbard St., Chicago 22, Ill.—LO
Eicor, Inc., 1501 W. Congress St., Chicago 7, Ill.—LL
Electro-Tech Equipment Co., 309 Canal St., New York 13, N. Y.—LI, LL
Equipment & Service Co., 6815 Oriole Dr., Dallas 9, Texas—LA, LM
FEDERAL TELECOMMUNICATION LABORATORIES, INC., 500 Washington Ave., Nutley 10, N. J.—LA, LE, LH
Fischer-Pierce Co., 170 Pearl St., S. Braintree, Boston 85, Mass.—LA
Gale Dorothea Mechanisms, 81-01 Broadway, Elmhurst, L. I., N. Y.—LC, LD
General Cement Mfg. Co., 919 Taylor Ave., Rockford, Ill.—LA
GENERAL ELECTRIC CO., ELECTRONICS DEPT., Syracuse, N. Y.—LA, LC, LD, LE, LG, LH, LD
General Electronics, Inc., 101 Hazel St., Paterson, N. J.—LE
General Radio Co., 275 Massachusetts Ave., Cambridge 39, Mass.—LD
Golde Mfg. Co., 1214 W. Madison St., Chicago 17, Ill.—LA, LK
Guth Co., Edwin F., 2615 Washington Ave., St. Louis 3, Mo.—LE, LH, LJ
Holub Industries, Inc., Sycamore, Ill.—LA, LL
Huggins Laboratories, 730 Hamilton Ave., Menlo Park, Calif.—LJ, LL
HUGHEY & PHILLIPS, 4075 Beverly Blvd., Los Angeles 4, Calif.—LA, LH, LJ
International Movie Producers' Service, 515 Madison Ave., New York 22, N. Y.—LA, LG, LH
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.—LK
Keese Engineering Co., 7358 Santa Monica Blvd., Hollywood 46, Calif.—LB, LE, LF, LJ
Kepco Laboratories, Inc., 149-14 41st Ave., Flushing 55, N. Y.—LL
Kliegl Bros., 321 W. 50th St., New York 19, N. Y.—LA, LB, LC, LD, LE, LG, LH, LJ, LK, LM
Kuthe Laboratories, Inc., 150 Summit St., Newark 4, N. J.—LE
Libra Film Distributors, 6525 Sunset Blvd., Holleywood 28, Calif.—LA, LC, LH
Marion Electrical Instrument Co., 400 Canal St., Manchester, N. H.—LI
Micro Engineering Corp., 15 E. Tujunga Ave., Burbank, Calif.—LA
Midco Mfg. Co., 607 N. 8th St., Sheboygan, Wisc.—LL
Mole-Richardson Co., 937 N. Sycamore Ave., Hollywood 38, Calif.—LH
North American Electric Lamp Co., 1014 Tyler St., St. Louis 6, Mo.—LH
Olesen Co., Otto K., 1534 Cahuenga Blvd., Hollywood 28, Calif.—LB, LC, LD, LE, LF, LH, LJ, LK
Onan & Sons, D. W., 3264 University Ave., SE, Minneapolis 14, Minn.—LL
Opad-Green Co., 71 Warren St., New York 7, N. Y.—LL
Petrick Brothers, Inc., 1938 N. Springfield Ave., Chicago 47, Ill.—LA
Photo Research Corp., 127 W. Alameda Ave., Burbank, Calif.—LI
Photovolt Corp., 95 Madison Ave., New York 16, N. Y.—LI
Radiant Lamp Corp., 300 Jelliff Ave., Newark 8, N. J.—LH
RADIO CORP. OF AMERICA, RCA VICTOR DIV., Camden, N. J.—LA, LC, LE, LH
Sola Electric Co., 4633 W. 16th St., Chicago 50, Ill.—LE
Standard Electrical Products Co., 400 E. First St., Dayton 2, Ohio—LD
Stroblite Co., 35 W. 52nd St., New York 19, N. Y.—LB, LF, LJ
Strong Electric Corp., 87 City Park Ave., Toledo 2, Ohio—LH, LK, LN, LQ
Super Electric Products Corp., 46 Oliver St., Newark 4, N. J.—LD
Superior Electric Co., 83 Laurel St., Bristol, Conn.—LD
Swank Films, 19 W. Fourth St., Dayton 2, Ohio—LA, LH
Switzer Bros., 1220 Huron Rd., Cleveland 15, Ohio—LB, LF
SYLVANIA ELECTRIC PRODUCTS, INC., 1740 Broadway, New York 10, N. Y.—LB, LE, LF, LH
Television Zoomar Corp., 500 Fifth Ave., New York 18, N. Y.—LE, LI
Tung-Sol Lamp Works Inc., 95 Eighth Ave., Newark 4, N. J.—LH
U. S. Motors Corp., 584 Nebraska St., Oshkosh, Wisc.—LL
UNIVERSAL AVIATION CORP., 230 Park Ave., New York 17, N. Y.—LC
Ward Leonard Electric Co., 115 S. McQueston Pkwy., Mt. Vernon, N. Y.—LD
Welch Mfg. Co., W. M., 1515 Sedgwick St., Chicago 10, Ill.—LI
WESTINGHOUSE ELECTRIC CORP., CONSTRUCTION & COMMUNICATIONS SEC. 10-L, E. PITTSBURGH, PA.—LA, LE, LH, LO
Williams, Brown & Earle, Inc., 918 Chestnut St., Philadelphia 7, Pa.—LI
Wincharger Corp., E. 7th & Division Sts., Sioux City, Iowa—LL
Winslow Co., 9 Liberty St., Newark 5, N. J.—LA

14—Motion Picture Equipment

Animation ..... MA
Auto rewinds ..... MB
Background screens ..... MC
Cameras, 35 mm ..... MD
Cameras, 16 mm ..... ME
Continuous projection reel ..... MF
Cue markers ..... MG
Editing ..... MH
Film cement ..... MAA
Film, raw stock ..... MI
Film scraper ..... MJ
Film storage ..... MK
Kinescope recording apparatus ..... ML
Lenses ..... MM
Optical apparatus ..... MN
Printing ..... MO
Processing ..... MP
Projectors, 16 mm ..... MZ
Projectors, 35 mm ..... MX
Projection screens ..... MQ
Rear projector ..... MR
Reflectors ..... MY
Sound reader ..... MS
Special effects ..... MT
Splicing ..... MU
Titling ..... MV
Viewfinder ..... MW

Ace Electric Mfg. Co., 1458 Shakespeare Ave., New York 52, N. Y.—MG, MJ, MU, MAA, MAB
Akeley Camera & Instrument Corp., 175 Varick St., New York 14, N. Y.—MA, MD, ME, MH, MM
American Bolex Co., 265 Madison Ave., New York, N. Y.—ME, MW
American Optical Co., Box A, Buffalo 15, N. Y.—MM, MN
Ansco Div., General Aniline & Film Corp., Binghamton, N. Y.—MI
Arlington Electric Prods., Inc., 55 Vandam St., New York 13, N. Y.—MH
Bache & Co., Semon, 636 Greenwich St., New York 14, N. Y.—MM
BACKGROUND ENGINEERS, 6511 DeLongpre, Hollywood 28, Calif.—MC
Baia Motion Picture Engineering, Inc., 120 Victor Ave., Detroit 3, Mich.—MH, MU
Barnes Development Co., 213 W. Baltimore Pike, Lansdowne, Pa.—MN
Bausch & Lomb Optical Co., 635 St. Paul St., Rochester 2, N. Y.—MM
BELL & HOWELL CO., 7100 McCormick Rd., Chicago 45, Ill.—MA, MD, ME, MF, MH, MJ, MM, MN, MO, MU, MW
BERNDT-BACH, INC., AURICON DIV., 7325 Beverly Blvd., Los Angeles 36, Calif.—ME, ML, MM, MO, MW
Brumberger Sales Corp., 34 34th St., Brooklyn 22, N. Y.—MF, MK
Buhl Optical Co., 1009 Beech Ave., Pittsburgh 12, Pa.—MN
Burke & James, 223 W. Madison St., Chicago, Ill.—MM
CAMERA EQUIPMENT CO., 1600 Broadway, New York 19, N. Y.—MA, MB, MC, MD, ME, MF, MG, MH, MJ, MM, MN, MQ, MS, MU, MW
Century Projector Corp., 729 7th Ave., New York 19, N. Y.—MM, MR, MX
Cineffects, Inc., 115 W. 45th St., New York 19, N. Y.—MA, MH, MO, MM
Cinema Research Corp., 7000 Romaine St., Hollywood 28, Calif.—MA, MH, MO, MP
Cinematic Developments & Cinechrome Laboratory, 2125 32nd Ave., San Francisco, Calif.—MD, ME, MH, MI, MM, MN, MO, MQ, MS, MT, MU, MV, MW
Cinetech Co., 106 West End Ave., New York 23, N. Y.—MD, ME
Colonial Films, 2118 Mass. Ave., N. W., Washington 8, D. C.—MA, ME, MH, MI, MK, MO, MP
Compco Corp., 2251 W. St. Paul Ave., Chicago 47, Ill.—MK
Consolidated Production, 540 W. Congress St., Detroit 26, Mich.—MD, ME
Cummins Business Machines Corp., 4740 Ravenswood Ave., Chicago 40, Ill.—MG
Da-Lite Screen Co., 2711 N. Pulaski Rd., Chicago 39, Ill.—MC
DeVry Corp., 1111 Armitage Ave., Chicago 14, Ill.—MD, ME
DuMONT LABORATORIES, ALLEN B., 1000 Main Ave., Clifton, N. J.—MR, MZ
Du Pont de Nemours & Co., Inc., E. I.—Wilmington, Del.—MI
Eastman Kodak Co., 343 State St., Rochester 4, N. Y.—MD, ME, MH, MI, MJ, MK, ML, MM, MN, MQ
E D L Co., 2007 S. Michigan Ave., Chicago 16, Ill.—MH, MP, MS

Today's news tonight!

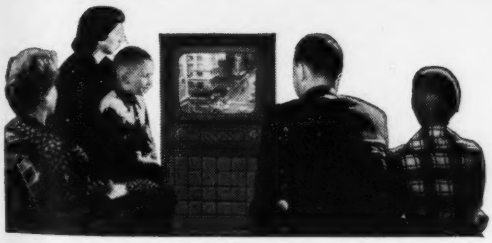
KTTV Staff Uses B&H Equipment To Make Deadlines

Station KTTV is attracting Los Angeles viewers with a daily "live" news reel. The popularity of this feature depends on getting on-the-spot movies of local events . . . editing and preparing them for showing the same evening . . . and making that showing a *finished* production.

To do this successfully, day in and day out, requires highly competent staff teamwork, plus the finest equipment. The staff at KTTV who work with Bell & Howell camera, projector and editing equipment have found it perfect for the job!

Shooting a street scene with a Bell & Howell 16mm "70" Camera

KTTV News Unit at work in the Film Editing Room. Man in center splices film at B&H Film Editor



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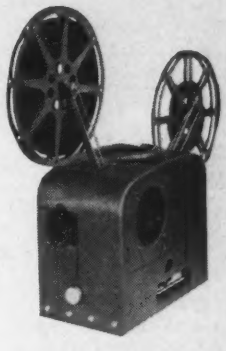

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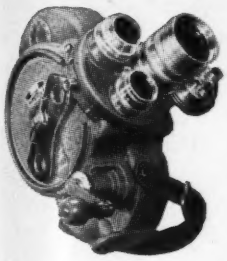

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Fairchild Recording Equip. Corp., 154th St. & 7th Ave., Whitestone, N. Y.—ML
Feiler Engineering Co., 8026 Monticello Ave., Skokie, Ill.—MA
Filmack Corp., 1327 S. Wabash Ave., Chicago 5, Ill.—MA, MH, MI, MK, MO, MP
Film Research Associates, 150 E. 52nd St., New York 22, N. Y.—MF
Fisher Co., Oscar, 1000 N. Division St., Peekskill, N. Y.—MP
Flett Laboratory, 17 Madison Ave., Lansdowne, Pa.—MT
Gale Dorothea Mechanisms, 81-01 Broadway, Elmhurst, L. I., N. Y.—MA, MT
GENERAL PRECISION LABORATORY, 63 Bedford Rd., Pleasantville, N. Y.—MD, ME, ML
Goldberg Bros., 1745 Wazee St., Denver, Colo.—MB
Golde Mfg. Co., 1214 W. Madison St., Chicago 17, Ill.—MB, MR, MT
Griswold Machine Works, 412 Main St., Port Jefferson, N. Y.—MH
Gundlach Mfg. Corp., Fairport, N. Y.—MM
Handy Organizations, Jam, 2821 E. Grand Blvd., Detroit 11, Mich.—ME, MM, MQ, MT, MU, MV, MW
Holmes Projector Co., 1815 Orchard St., Chicago 14, Ill.—MR
HOUSTON-FEARLESS CORP., 11801 W. Olympic Blvd., Los Angeles 25, Calif.—MO, MP
Industrial Cinema Service, 4119 W. North Ave., Chicago 39, Ill.—MD, ME, MF, MH, MI, MJ, MK, MM, MO, MQ
International Movie Producers' Service, 515 Madison Ave., New York 22, N. Y.—ME, MH, MM
Kin-O-Lux, Inc., 105 W. 40th St., New York 18, N. Y.—MI, MO, MP
Kollmorgen Optical Corp., 2 Franklin Ave., Brooklyn 11, N. Y.—MM, MN
Lektra Laboratories, Inc., 154 11th Ave., New York 11, N. Y.—MU
Libra Film Distributors, 6525 Sunset Blvd., Hollywood 28, Calif.—MA, MH, MK, MO, MP
Magnagram Corp., 11338 Burbank Blvd., N. Hollywood, Calif.—MH, ML
Manufacturers Research Corp., 17 W. Mulberry St., Baltimore 1, Md.—MA, MD, ME
Maurer, Inc., J. A., 37-01 31st St., Long Island City 1, N. Y.—MA, ME, MH, ML, MW
Merix Chemical Co., 1021 E. 55th St., Chicago 15, Ill.—MK
Michigan Film Library, 15745 Rosemont Rd., Detroit 23, Mich.—ME, MQ
Micro Engineering Corp., 15 E. Tujunga Ave., Burbank, Calif.—MA, MD, ME, MH, MI, MK, MM, MO, MP
Michell Camera Corp., 666 W. Harvard St., Glendale 4, Calif.—MD, ME, MM, MW
Morton Co., 86 S. 6th St., Minneapolis 2, Minn.—ME
Moviola Mfg. Co., 1451 Gordon St., Hollywood 28, Calif.—MH, MS
National Cine Equipment, Inc., 20 West 22nd St., New York 10, N. Y.—MA, MD, ME, MH, ML, MM, MN
National Sound Projector, 8044 N. Ridgeway, Skokie, Ill.—MM
Nemeth Studios, Ted, 729 Seventh Ave., New York 19, N. Y.—MH, MI
Neumade Products Corp., 330 W. 42nd St., New York 18, N. Y.—MB, MG, MH, MJ, MK, MU
Paillard Products, Inc., 265 Madison Ave., New York 16, N. Y.—MA, ME, MH, MM, MN, MU, MV, MW
Pancro Mirrors, Inc., 2958 Los Feliz Blvd., Los Angeles 39, Calif.—MQ, MY
Paramount TV Productions, 1501 Broadway, New York 18, N. Y.—ML
Pentron Corp., 221 E. Cullerton St., Chicago 16, Ill.—ML
Perkin-Elmer Corp., Main Ave., Norwalk, Conn.—MM
Petrick Bros., Inc., 1938 N. Springfield Ave., Chicago 47, Ill.—MQ
Photo Research Corp., 127 W. Alameda Ave., Burbank, Calif.—MW
Precision Products Inc., 719 17th St., N.W., Washington, D. C.—ME, MM, MP
Prestoseal Mfg. Corp., 38-01 Queens Blvd., Long Island City, N. Y.—MU
Producers Service Co., 2704 W. Olive Ave., Burbank, Calif.—MA, MD, ME, ML, MN, MO, MR, MT, MV
Projection Optics Co., 330 Lyell Ave., Rochester 6, N. Y.—MN
Radiant Mfg. Corp., 2627 W. Roosevelt Rd., Chicago 8, Ill.—MQ
RADIO CORP. OF AMERICA, RCA-VICTOR DIV., Camden, N. J.—ML, MM, MP
Raven Screen Corp., 124 E. 124th St., New York 35, N. Y.—MQ
Raytone Screen Corp., 165 Clermont Ave., Brooklyn 5, N. Y.—MM, MQ
Republic Lens Co., 916 Ninth Ave., New York 19, N. Y.—MM
Saftee Glass Co., 4717 Stenton Ave., Philadelphia 44, Pa.—MM
Sanders, Sidney A., 1036 Wooster St., Los Angeles 35, Calif.—MC
Simpson Optical Mfg. Co., 3200 W. Carroll Ave., Chicago 24, Ill.—MM, MN
S. O. S. CINEMA SUPPLY CO., 602 W. 52nd St., New York 19, N. Y.—MC, MG, MH, MO, MP, MR, MS
Spellman Television Co., Inc., 3029 Webster Ave., Bronx, N. Y.—MM
Swank Films, 19 W. Fourth St., Dayton 2, Ohio—MA, MD, ME, MK, MI, MM, MO, MP
Tech Laboratories, Inc., Bergen & Edsall Blvds., Palisades Park, N. J.—MU
TELECHROME, INC., 88 Merrick Rd., Amityville, L. I., N. Y.—ML, MN, MT
Telemated Cartoons, 70 E. 45th St., New York 17, N. Y.—MA
Television Associates, Inc., E. Michigan St., Michigan City, Ind.—MA, MF
Television Cartoons, Inc., 361 W. Broadway, New York 13, N. Y.—MA, MD, ME, MH, MI, MM
Televisor Co., 515 Madison Ave., New York 22, N. Y.—MC, MQ
Trans-Lux Corp., 1270 Seventh Ave., New York, N. Y.—MC, MM, MQ
Universal Reels, 9-16 37th Ave., Long Island City, N. Y.—MF
Victor Animatograph Co., Davenport Bank Bldg., Davenport, Iowa—MZ
Vocalite Screen Corp., 19 Debevoise Ave., Roosevelt, N. Y.—MQ
Wenzel Projector Co., 2509 S. State St., Chicago 16, Ill.—MD
Williams, Brown & Earle, Inc., 918 Chestnut St., Philadelphia, Pa.—MB, MD, ME, MF, MG, MH, MJ, MK, MM, MN, MO, MP, MQ, MR, MS, MU, MV, MW
Williams Screen Co., 1620 Summit Blvd., Akron, Ohio—MQ
Woodruff Associates, 831 First Ave., New York 22, N. Y.—MA, MT, MV
Zenith Optical Laboratory, 1920 Great Neck Rd., Copaigue, N. Y.—MM, MN

15—*Audio Equipment*

Accessories ..... PA
Amplifiers
- **Cueing** ..... PB
- **Limiting** ..... PC
- **Line** ..... PD
- **Mixing** ..... PE
- **Monitoring** ..... PF
- **Noise suppressing** ..... PG
- **Program** ..... PH
- **Recording** ..... PI
- **Remote** ..... PJ

Attenuators ..... PK
Consoles, control ..... PL
Consoles, dubbing ..... PM
Equalizers ..... PN
Filters, sound effects ..... PO
Filters, equalizing ..... PP
Handsets ..... PAI
Headsets ..... PAJ
Intercom systems ..... PQ
Jack panels ..... PR
Microphones
- **Carbon** ..... PAH
- **Condenser** ..... PS
- **Crystal** ..... PT
- **Dynamic** ..... PU
- **Miscellaneous** ..... PV
- **Velocity** ..... PW

Microphone nameplates ..... PX
Microphone stands & booms ..... PY
Microphones, carbon ..... PAH
Power supplies ..... PZ
Pre-amplifiers ..... PAA
Radio cueing systems ..... PAB
Sound effects console ..... PAC
Sound reinforcement systems ..... PAD
Studio control consoles ..... PAE
Switching systems ..... PAF

Accurate Engineering Co., 2005 Blue Island Ave., Chicago 8, Ill.—PZ
Airtronix Development Corp., 20 W. 22nd St., New York 10, N. Y.—PAD
ALTEC LANSING CORP., 9356 Santa Monica Blvd., Beverly Hills, Calif.—PC, PD, PE, PF, PH, PI, PL, PP, PZ, PAA, PAD
American Communications Corp., 306 Broadway, New York, N. Y.—PA, PB, PD, PE, PF, PH, PI, PJ, PL, PN, PQ, PR, PZ, PAA, PAD, PAE, PAF
American Microphone Co., 370 S. Fair Oaks Ave., Pasadena 1, Calif.—PS, PT, PU, PV, PW, PY
AMPERITE CO., 561 Broadway, New York 12, N. Y.—PV
Approved Electronic Instrument Corp., 142 Liberty St., New York 6, N. Y.—PAA
Arlington Electric Prods., Inc., 55 Vandam St., New York 13, N. Y.—PC, PD, PE, PF, PJ, PL, PM, PR, PAA, PAE, PAF
Art Specialty Co., 3245 W. Lake St., Chicago 24, Ill.—PA, PY
Astatic Corp., Harbor & Jackson Sts., Conneaut, Ohio—PT, PU, PV
Atlas Sound Corp., 1449 39th St., Brooklyn 18, N. Y.—PY
Audio Development Co., 2833 13th Ave., S. Minneapolis 7, Minn.—PAD
Audio Equipment Co., 80-20 45th Ave., Elmhurst, L. I., N. Y.—PAD
Audio Instruments, 133 W. 14 St., New York 11, N. Y.—PAA
Bell Sound Systems, Inc., 555 Marion Rd., Columbus 7, Ohio—PF, PI, PQ
BENDIX RADIO DIV., BENDIX AVIATION CORP., Baltimore 4, Md.—PC
Berkeley Custom Electronics, 2571 Shattuck Ave., Berkeley 4, Calif.—PI, PP
BERLANT ASSOCIATES, 4917 W. Jefferson Blvd., Los Angeles 16, Calif.—PI, PN, PP, PAA
Berndt-Bach, Inc., Auricon Div., 7325 Beverly Blvd., Los Angeles 36, Calif.—PI, PU
Bestcraft Products Co., 626 Broadway, New York 12, N. Y.—PA
Bogen Co., David, 663 Broadway, New York 12, N. Y.—PD, PE, PF, PJ, PQ, PAA
Boom Electric & Amplifier Co., 1227 W. Washington Blvd., Chicago 7, Ill.—PAD
Brociner Electronics Laboratory, 1546 Second Ave., New York 28, N. Y.—PD, PF, PH, PI, PJ, PN, PZ, PAA

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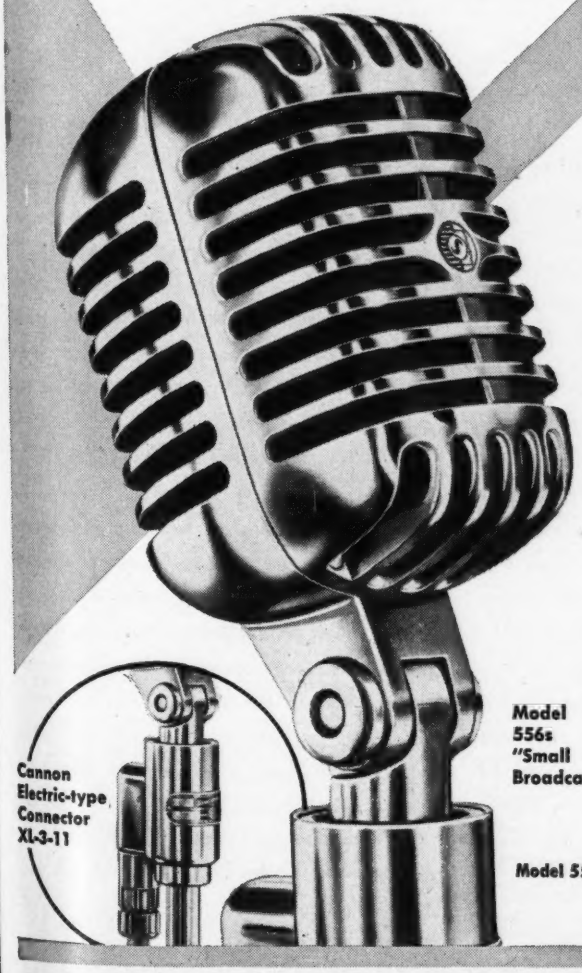

Cannon Electric-type Connector XL-3-11

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Big improvements have been made on this *all new* Microphone. It is new on the inside as well as outside. This mighty, though little, Microphone is the *only* small-sized uni-directional moving-coil Broadcast-type Dynamic Microphone. The 556s "Broadcast" achieves new, extended high-fidelity response with an ultra-cardioid directional pattern. It is specially constructed to meet the requirements of radio and television broadcast studios, with close tolerances in frequency response and directivity.

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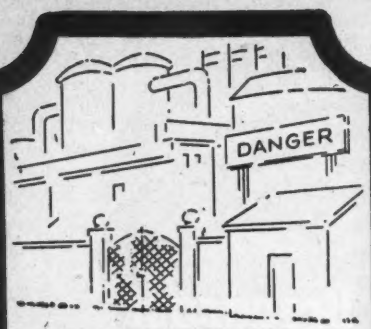

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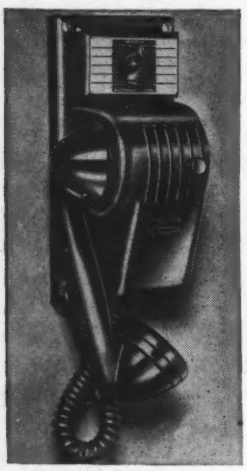
Sound Powered

TELEPHONES



- **NO BATTERIES**
- **NO OUTSIDE POWER**
- **NO ELECTRICAL HAZARD**
- **NO MAINTENANCE**

Besides being a practical low cost system for every day intercom services (up to 12 stations), Wheeler Sound Powered equipment is SPECIALLY adapted to meet UNUSUAL needs where added *privacy*, continuity in event of power failure, *almost negligible* electrical currents and freedom from expense of deterioration are factors.

Wide adaptability... ringing or visual call... rugged construction... special high level units for noisy locations. Write us for full details and recommendations.

Available through national distributors such as G. E. Supply, Westinghouse Electric Supply, Allied Radio or your independent electrical or electronic jobber.

THE **WHEELER**

INSULATED WIRE CO., Inc.

Division of the Sperry Corp.

1107 EAST AURORA ST.

WATERBURY 20, CONN.

Brook Electronics, Inc., 34 DeHart Pl., Elizabeth, N. J. —PI

Brumberger Sales Corp., 34 34th St., Brooklyn 32, N. Y. —PA

Brush Development Co., 3405 Perkins Ave., Cleveland 14, Ohio—PI, PT

Caltron Prods. Co., 1406 S. Hobart Blvd., Los Angeles 6, Calif.—PA, PI, PAA

Cinema Engineering Co., 1510 W. Verdugo Ave., Burbank, Calif.—PA, PAE

Cinematic Developments & Cinechrome Laboratory, 2125 32nd Ave., San Francisco 8, Calif.—PE, PI, PN, PP

Clarke Instruments, 919 Jesup-Blair Drive, Silver Spring, Md.—PR

CLARKSTAN CORP., 11921 W. Pico Blvd., Los Angeles 64, Calif.—PA, PN, PP, PAA

Clarostat Mfg. Co., Washington St., Dover, N. H.—PK

Coax-Electronics Co., 1524 E. 15th St., Brooklyn 30, N. Y. —PB, PE, PF, PH, PI, PJ, PL, PAE

Coil Winders, Inc., 61 Bergen St., Brooklyn 2, N. Y.— PN, PO, PP

Collins Audio Prods. Co., P. O. Box 368, Westfield, N. J. —PE, PF, PI, PZ, PAA

Collins Radio Co., Cedar Rapids, Iowa—PA, PV, PY, PAC, PAE

Colonial Brass Co., Middleboro, Mass.—PX

Color Tran Converter Co., 7045 Romaine, Hollywood 38, Calif.—PY

Communication Accessories, Hickman Mills, Mo.—PN, PO, PP

Compco Corp., 2251 W. St. Paul Ave. Chicago 47, Ill.— PA

Connecticut Telephone & Electric Corp., 70 Britannia St., Meriden, Conn.—PQ, PR, PAF

Cooper Electronic Prods. Co., 4500 Melrose St., Philadelphia, Pa.—PQ

Cornell Dubilier Electric Corp., 333 Hamilton Blvd., South Plainfield, N. J.—PZ

Daven Co., 191 Central Ave., Newark, N. J.—PA, PK, PN, PO, PP, PAB

Dazor Mfg. Co., 4463 Duncan Ave., St. Louis 10, Mo.— PY

DeCoursey Engineering, P.O. Box 235, Los Angeles 25, Calif.—PO

DeVry Corp., 1111 Armitage Ave., Chicago, Ill.—PAD

Dilks Co., Box 139, Seymour, Conn.—PAD

Display Lighting, Inc., 417 E. 61st St., New York 21, N. Y.—PY

Drake Co., R. L., 11 Longworth St., Dayton 2, Ohio— PA, PP, PZ

DuKane Corp., St. Charles, Ill.—PV

Dyna-Labs, Inc., 132 Lafayette St., New York 13, N. Y. —PT

Eicor, Inc., 1501 W. Congress St., Chicago 7, Ill.—PZ

Electrodyne Co., 32 Oliver St., Boston 10, Mass.—PZ, PAA

Electronic Measurements Co., Red Bank, N. J.—PZ

Electro Prods. Laboratories, 4501 N. Ravenswood Ave., Chicago 40, Ill.—PZ

Electro-Voice, Inc., Carroll & Cecil Sts., Buchanan, Mich. —PT, PU, PV, PW, PY

Executone, Inc., 415 Lexington Ave., New York 17, N. Y. —PQ

Fairchild Recording Equipment Corp., 154th St. & 7th Ave., Whitestone, N. Y.—PB, PD, PE, PF, PH, PI, PL, PM, PN, PZ, PAA

FEDERAL TELECOMMUNICATION LABORATORIES, INC., 500 Washington Ave., Nutley 10, N. J.—PA, PK, PL, PQ, PR, PU, PV, PW, PX, PY, PZ, PAA, PAB, PAE

Ferrar Radio & Television Corp., 55 W. 26th St., New York 10, N. Y.—PQ, PZ, PAA

Fidelity Amplifier Co., 703 Willow St., Chicago, Ill.— PAA

Freed Transformer Co., 1718 Weirfield St., Brooklyn 27, N. Y.—PN, PO, PP, PZ

Furst Electronics, 12 S. Jefferson St., Chicago 6, Ill.—PZ

Gale Dorothea Mechanisms, 81-01 Broadway, Elmhurst, L. I., N. Y.—PL, PAC, PAE

GATES RADIO CO., Quincy, Ill.—PA, PV, PY, PAC, PAD, PAE

General Cement Mfg. Co., 919 Taylor Ave., Rockford, Ill. —PA

GENERAL ELECTRIC CO., ELECTRONICS DEPT., Syracuse, N. Y.—PA, PV, PY, PAC, PAE

General Radio Co., 275 Massachusetts Ave., Cambridge 39, Mass.—PK

Geraton Products, 2115 N. Charles St., Baltimore 18, Md. —PAD, PAE

Godfrey Mfg. Co., 171 S. 2nd St., Milwaukee 4, Wisc.— PQ

Gray Research & Development Co., 16 Arbor St., Hartford, Conn.—PN, PAC

Gulton Mfg. Corp., 212 Durham Ave., Metuchen, N. J.— PO, PS, PT, PV, PAA

Hamilton Electronics, 2726 Pratt Ave., Chicago 45, Ill.— PA, PY, PAD, PAE

Harvey-Wells Electronics, Inc., North St., Southbridge, Mass.—PAA

Hastings Instrument Co., Super Highway & Pine Ave., Hampton, Va.—PD

Highland Engineering Co., Main & Urban Sts., Westbury, N. Y.—PA

Holub Industries, Inc., Sycamore Ill.—PA, PZ

Inductograph Prods., Inc., 236 W. 55th St., New York 19, N. Y.—PZ

Intercall Systems, Inc., 10 Norwood Ave., Dayton 1, Ohio —PQ

International Projector Corp., 55 LaFrance Ave., Bloomfield, N. J.—PAD

KELLOGG SWITCHBOARD & SUPPLY CO., 6650 S. Cicero Ave., Chicago 38, Ill.—PO, PS, PAF

Kepco Laboratories, Inc., 149-14 41st Ave., Flushing 55, N. Y.—PZ

Keystone Electronics Co., 423 Broome St., New York 13, N. Y.—PA

K-F Development Co., 820 Woodside Way, San Mateo, Calif.—PQ

K-V Transformer Corp., 4412 Park Ave., New York 57, N. Y.—PP

Langevin Mfg. Corp., 37 W. 65th St., New York 23, N. Y. —PA, PB, PC, PD, PE, PF, PH, PI, PJ, PZ, PAA, PAD

Libra Film Distributors, 6525 Sunset Blvd., Hollywood 28, Calif.—PA, PV, PY, PAC

Livingston Electronic Corp., Livingston, N. J.—PA

Loge, Sound Engineers, J. M., 2171 W. Washington Blvd., Los Angeles 18, Calif.—PD, PQ, PZ, PAA, PAD

Lyman Electronic Corp., 12 Cass St., Springfield 4, Mass. —PQ

McClure Talking Pictures, O. J., 1115 W. Washington Blvd., Chicago 7, Ill.—PAD

McIntosh Laboratory, Inc., 320 Water St., Binghamton, N. Y.—PAD

Meletron Corp., 950 N. Highland Ave., Los Angeles, Calif. —PY

Merix Chemical Co., 1021 E. 55th St., Chicago 15, Ill.— PA

Meyers, James G., 1056 Sheridan Ave., Bronx 56, N. Y. —PG, PI

Mico Instrument Co., 75 Trowbridge St., Cambridge, Mass.—JF

Midco Mfg. Co., 607 No. 8th St., Sheboygan, Wisc.—PZ

Mid-West Coil & Transformer Co., 1642 N. Halsted St., Chicago 17, Ill.—PZ

Millen Mfg. Co., James, 150 Exchange St., Malden 48, Mass.—PZ

Modern Telephone Corp., 509 Madison Ave., New York 22, N. Y.—PQ

Modulation Products Co., 56 Lispenard St., New York, N. Y.—PAD

Motiography, Inc., 4431 W. Lake St., Chicago, Ill.—PAD

MP Concert Installations, Fairfield, Conn.—PD, PE, PF, PI, PZ, PAA

National Inter-Communicating Systems, 1531 Devon Ave., Chicago 26, Ill.—PQ

Neptune Electronics Co., 433 Broadway, New York 13, N. Y.—PA

Network Mfg. Corp., 213 W. 5th St., Bayonne, N. J.— PZ, PAA

Newcomb Audio Prods. Co., 6824 Lexington Ave., Hollywood 38, Calif.—PAA

O'Brien Electric Co., 5326 Sunset Blvd., Hollywood 27, Calif.—PL, PM, PQ, PAB, PAD, PAE, PAF

Ohmite Mfg. Co., 4835 W. Flournoy St., Chicago 44, Ill. —PK

Oleson Co., Otto K., 1534 Cahuenga Blvd., Hollywood 28, Calif.—PB, PC, PD, PE, PF, PH, PI, PJ, PL, PM, PO, PQ, PR, PU, PW, PY, PAA, PAC, PAD, PAE, PAF

Opad-Green Co., 71 Warren St., New York 7, N. Y.—PZ

Orthon Corp., 196 Albion Ave., Paterson 2, N. J.—PA, PD, PE, PG, PK, PN, PO, PP, PQ, PZ, PAA

Pan-Electronics Co., 290 Bonner Pl., New York 56, N. Y. —PE, PF, PI, PQ, PAA, PAD

Pentron Corp., 221 E. Cullerton St., Chicago 16, Ill.—PI, PQ, PZ, PAA

PERM-O-FLUX CORP., 4900 W. Grand Ave., Chicago 39, Ill.—PA, PU

Pickering & Co., 309 Woods Ave., Oceanside, L. I., N. Y. —PN, PAA

POLARAD ELECTRONICS CORP., 100 Metropolitan Ave., Brooklyn 11, N. Y.—PAB

Precision Electronics, 641 Milwaukee Ave., Chicago 22, Ill.—PA

Press Wireless Mfg. Co., Cantiague Rd., Hicksville, N. Y. —PC, PD, PF, PH, PI

Racon Electric Co., 52 E. 19th St., New York, N. Y.— PY

RADIO CORP. OF AMERICA, RCA-VICTOR DIV., Camden, N. J.—PA, PV, PY, PAC, PAD, PAE

Radio-Music Corp., 84 S. Water St., Port Chester, N. Y. —PB, PF, PN, PP, PAA, PAC

Rauland-Borg Corp., 3523 W. Addison St., Chicago 18, Ill.—PQ, PAD

Reeves-Hoffman Corp., 321 Cherry St., Carlisle, Pa.— PAE

Rek-O-Kut Co., 38-01 Queens Blvd., Long Island City 1, N. Y.—PI, PT, PU, PW

Roanwell Corp., 662 Pacific St., Brooklyn 17, N. Y.—PU, PV, PAH, PAI, PAJ

Rosen Engineering Prods., Inc., Raymond, 32nd & Walnut Sts., Philadelphia 4, Pa.—PL

Rowe Industries, 1702 Wayne St., Toledo 9, Ohio—PD, PE, PZ, PAA

St. Louis Microphone Co., 2726 Brentwood Blvd., St. Louis, 17, Mo.—PV

Sargent-Rayment Co., 212 Ninth St., Oakland 7, Calif.— PAA

Scott, Inc., Hermon Hosmer, 385 Putnam Ave., Cambridge 39, Mass.—PG, PN, PP, PZ, PAA

Shallcross Mfg. Co., Jackson & Pusey Aves., Collingdale, Pa.—PK

Shrader Mfg. Co., 2803 M. Street, N.W., Washington, D. C.—PB, PC, PD, PE, PF, PG, PH, PI, PJ, PK, PL, PN, PQ, PR, PS, PT, PU, PV, PW, PZ, PAA, PAE, PAF

SHURE BROS., INC., 225 W. Huron St., Chicago 19, Ill. —PT, PU, PV

Sierra Electronic Corp., 1050 Brittan Ave., San Carlos, Calif.—PZ

Simplophone Corp. of America, 303 Fifth Ave., New York 16, N. Y.—PQ

Simpson Mfg. Co., Mark, 32-28 49th St., Long Island City 3, N. Y.—PD, PE, PF, PH, PI, PJ, PQ, PAA, PAD

Smith-Meeker Engineering Co., 157 Chambers St., New York 7, N. Y.—PAD, PAE, PAF

Sonar Radio Corp., 59 Myrtle Ave., Brooklyn 1, N. Y.— PB, PD, PE, PF, PI, PJ, PAA

Sorensen & Co., 375 Fairfield Ave., Stamford, Conn.—PZ

Special Prods. Co., 9115 Brookville Rd., Silver Spring, Md.—PY

Spellman Television Corp., 3029 Webster Ave., Bronx, N. Y.—PV
Spencer-Kennedy Laboratories, Inc., 186 Massachusetts Ave., Cambridge 39, Mass.—PO
Square Root Mfg. Corp., 391 Saw Mill River Rd., Yonkers, N. Y.—PC
Srepco, Inc., 135 E. 2nd St., Dayton 2, Ohio—PA, PX
Stephens Mfg. Corp., 8538 Warner Dr., Culver City, Calif.—PB, PC, PD, PE, PF, PH, PI, PJ, PL, PM, PN, PO, PP, PS, PZ, PAA, PAC, PAD, PAE
Stromberg-Carlson Co., 100 Carlson Rd., Rochester 3, N. Y.—PAD
Talk-A-Phone Co., 1512 S. Pulaski Rd., Chicago 23, Ill.—PQ, PAD
Tech Laboratories, Inc., Bergen & Edsall Blvds., Palisades Park, N. J.—PK
Telectro Industries Corp., 35-16 37th St., Long Island City 1, N. Y.—PI, PQ, PZ, PAA, PAF
Television Utilities Corp., 1261 Broadway, New York 1, N. Y.—PD
Thordarson-Meissner Mfg. Div., Maguire Industries, Inc., 500 W. Huron St., Chicago 10, Ill.—PA
Tibbetts Industries, Inc., Camden, Me.—PT
Trimm, Inc., 400 W. Lake St., Libertyville, Ill.—PR
Turner Co., 909 17th St., N.E., Cedar Rapids, Iowa—PT, PU, PV, PW
U. S. Recording Co., 1121 Vermont Ave., N.W., Washington 5, D. C.—PAC, PAE
UNIVERSAL AVIATION CORP., 230 Park Ave., New York 17, N. Y.—PL, PM
Valco Mfg. Co., 4700 W. Walton, Chicago 51, Ill.—PV
Vokar Corp., 7300 Huron River Dr., Dexter, Mich.—PO, PP, PR
Warren Mfg. Co., 250 East St., New Haven, Conn.—PA
Waveforms, Inc., 333 Sixth Ave., New York 14, N. Y.—PD, PF, PH, PN, PP, PAA, PAF
Webster Electric Co., 1900 Clark St., Racine, Wisc.—PH, PQ
Western Sound & Electric Labs., 805 S. 5th St., Milwaukee Wisc.—PA, PI, PQ, PAD
WHEELER INSULATED WIRE CO., 1107 E. Aurora St., Waterbury 20, Conn.—PQ
Winslow Co., 9 Liberty St., Newark 5, N. J.—PA

FIELD EQUIPMENT

16—Remote Pickup—Video

Accessories ..... NA
Antennas ..... NB
Camera controls ..... NC
Camera switching systems ..... ND
Dollies ..... NE
Field cameras ..... NF
Lenses ..... NG
Microwave receivers ..... NH
Microwave transmitters ..... NI
Monitors ..... NO
Power supplies ..... NJ
Sync. generators ..... NK
Tripods ..... NL
Waveguides ..... NM

Accurate Engineering Co., 2005 Blue Island Ave., Chicago 8, Ill.—NJ
Airtron, Inc., 101 E. Elizabeth Ave., Linden, N. J.—NB, NM
Akeley Camera & Instrument Corp., 175 Varick St., New York 14, N. Y.—NC, ND, NE, NF, NG, NL
Alpar Mfg. Co., 466 St. Francis St., Redwood City, Calif.—NB
American Electroneering Co., 5025-19 W. Jefferson Blvd., Los Angeles 16, Calif.—NJ
American Television, Inc., 523 South Plymouth Court, Chicago 5, Ill.—ND, NJ, NK
American Television & Radio Co., 300 E. 4th St., St. Paul 1, Minn.—NJ
ANDREW CORP., 363 E. 75th St., Chicago 19, Ill.—NB
Antenna Research Laboratory, Inc., 797 Thomas Lane, Columbus 14, Ohio—NB
Bache & Co., Semon, 636 Greenwich St., New York 14, N.Y.—NG
Back Video Corp., F. G., 500 Fifth Ave., New York 18, N.Y.—NG
Bausch & Lomb Optical Co., 635 St. Paul St., Rochester 2, N.Y.—NG
Bendix Aviation Corp., Red Bank Div., Red Bank, N.J.—NJ
Burke & James, 223 W. Madison St., Chicago, Ill.—NG
CAMERA EQUIPMENT CO., 1600 Broadway, New York 19, N. Y.—NE, NG, NL
Communication Products Co., Marlboro, N.J.—NB
Da-Lite Screen Co., 2711 N. Pulaski Rd., Chicago 39, Ill.—NA, NL
Dalmo Victor Co., 1414 El Camino Real, San Carlos, Calif.—NH, NI
Daven Co., 191 Central Ave., Newark, N.J.—ND
Display Lighting, Inc., 417 E. 61st St., New York 21, N. Y.—NE, NG, NL
Drake Co., R. L., 11 Longworth St., Dayton 2, Ohio—NB, NJ
DUMONT LABORATORIES, ALLEN B., 1000 Main Ave., Clifton, N. J.—NA, NC, ND, NE, NF, NG, NH, NI, NJ, NK, NL
Eastman Kodak Co., 343 State St., Rochester 4, N.Y.—NG
Eicor, Inc., 1501 W. Congress St., Chicago 7, Ill.—NJ
Electronic Measurements Co., Red Bank, N.J.—NH, NI, NJ
Electro Prods. Laboratories, 4501 N. Ravenswood Ave., Chicago, Ill.—NJ
Equipment & Service Co., 6815 Oriole Dr., Dallas 9, Texas.—NA
FEDERAL TELECOMMUNICATION LABORATORIES, INC., 500 Washington Ave., Nutley 10, N.J.—NA, NC, ND, NE, NF, NG, NH, NI, NJ, NK, NL
Gadgets, Inc., 3629 N. Dixie Dr., Dayton 4, Ohio—NB
GENERAL ELECTRIC CO., ELECTRONICS DEPT., Syracuse, N.Y.—NA, NC, ND, NE, NF, NG, NH, NI, NJ, NK, NL
GENERAL PRECISION LABORATORIES, INC., 63 Bedford Rd., Pleasantville, N.Y.—NA, NB, NC, ND, NE, NF, NG, NJ, NK, NL, NM
Gundlach Mfg. Corp., Fairport, N.Y.—NG
G. W. Associates, P. O. Box 2263 El Segundo, Calif.—NH, NI, NM
Hamilton Electronics, 2726 Pratt Ave., Chicago 45, Ill.—NJ
Holub Industries, Inc., Sycamore, Ill.—NA
Inductograph Prods., Inc., 236 W. 55th St., New York 19, N.Y.—NJ
Industrial Electrical Works, 1509 Chicago St., Omaha, Nebr.—NO
J. & A. Television & Mfg. Co., 5066 Broadway, Chicago 40, Ill.—NK
Jamaica Television Mfg. Co., 95-26 Sutphin Blvd., Jamaica 4, L. I., N. Y.—NC, ND, NF, NI, NJ, NK
Kepco Laboratories, Inc., 149-14 41st Ave., Flushing 55, N.Y.—NJ
Kings Microwave Co., 50 Marbledale Rd., Tuckahoe, N.Y.—NB, NH, NI, NM
Kollmorgen Optical Corp., 2 Franklin Ave., Brooklyn 11, N.Y.—NG
LaPointe Plascomold Corp., Windsor Locks, Conn.—NB
Libra Film Distributors, 6525 Sunset Blvd., Hollywood 28, Calif.—NA, NC, ND, NE, NF, NG, NJ, NL
Lingo & Son, Inc., John E., 2814 Buren Ave., Camden 5, N.J.—NB
Merix Chemical Co., 1021 E. 55th St., Chicago 15, Ill.—NA
Micro Engineering Corp., 15 E. Tujunga Ave., Burbank, Calif.—NA, NC, ND, NE, NF, NG, NH, NI, NJ, NK, NL
Microwave Equipment Co., Caldwell, N. J.—NM
Midco Mfg. Co., 607 So. 8th St., Sheboygan, Wisc.—NJ
Millen Mfg. Co., James, 150 Exchange St., Malden 48, Mass.—NJ
National Cine Equipment, Inc., 20 W. 22nd St., New York 10, N.Y.—NE, NL
National Electronics Mfg. Corp., 42-08 Vernon Blvd., Long Island City 1, N.Y.—NB
Network Mfg. Corp., 213 W. 5 St., Bayonne, N.J.—NB, NJ
Onan & Sons, D. W., 3164 University Ave., Minneapolis 14, Minn.—NJ
Opad-Green Co., 71 Warren St., New York 7, N.Y.—NJ
Perkin-Elmer Corp., Main Ave., Norwalk, Conn.—NG
Petrick Bros., Inc., 1938 N. Springfield Ave., Chicago 47, Ill.—NL
Philco Corp., Tioga & C Sts., Philadelphia 34, Pa.—NH, NI, NJ
POLARAD ELECTRONICS CORP., 100 Metropolitan Ave., Brooklyn 11, N.Y.—NC, ND, NF, NJ, NK
Precise Development Corp., 999 Longbeach Rd., Oceanside, L. I., N. Y.—NJ
Precision Products, Inc., 719 17th St., N.W., Washington, D.C.—NF, NG
Press Wireless Mfg. Co., Cantiague Rd., Hicksville, N.Y.—NM
Product Development Co., 526 Elm St., Arlington, N.J.—NB
Projection Optics Co., 330 Lyell Ave., Rochester 6, N.Y.—NG
RADIO CORP. OF AMERICA, RCA VICTOR DIV., Camden, N.J.—NA, NC, ND, NE, NF, NG, NH, NI, NJ, NK, NL
Raytheon Mfg. Co., Willow St., Waltham, Mass.—NH, NI, NM
Republic Lens Co., 916 Ninth Ave., New York 19, N.Y.—NG
Saftee Glass Co., 4717 Stenton Ave., Philadelphia 44, Pa.—NG
SARKES TARZIAN, INC. (see Tarzian, Inc., Sarkes)
Sierra Electronic Corp., 1050 Brittan Ave., San Carlos, Calif.—NJ
SNYDER MFG. CO., 22nd & Ontario Sts., Philadelphia, Pa.—NB
Sorensen & Co., 375 Fairfield Ave., Stamford, Conn.—NJ
Spellman Television Corp., 3029 Webster Ave., New York 67, N.Y.—NJ
TARZIAN INC., SARKES, 539 S. Walnut St., Bloomington, Ind.—NH, NI
TELECHROME, INC., 88 Merrick Rd., Amityville, L.I. N.Y.—NA, NK
Television Utilities Corp., 1261 Broadway, New York 1, N.Y.—NO
Television Zoomar Corp., 500 Fifth Ave., New York 18, N.Y.—NG
Terpening Co., L. H., 16 W. 61st St., New York 23, N.Y.—NM
Thordarson-Meissner Mfg. Div., Maguire Industries, Inc., 500 W. Huron St., Chicago 10, Ill.—NJ
Trio Mfg. Co., Griggsville, Ill.—NA
Ward Prods. Corp., Div. Gabriel Corp., 1523 E. 45th St., Cleveland 3, Ohio—NB
Western Electronic Enterprises, 3348 W. Compton Blvd., Gardena, Calif.—NB, NM
Weston Laboratories, 410 Glen Rd., Weston 93, Mass.—NJ
Weymouth Instrument Co., 1440 Commercial St., E. Weymouth 89, Mass.—NH, NI, NM
Winslow Co., 9 Liberty St., Newark 5, N.J.—NA
WORKSHOP ASSOCIATES, DIV., GABRIEL CO., 135 Crescent Rd., Needham Heights 94, Mass.—NB

17—Remote Pickup—Audio

Amplifiers ..... OA
Auxiliary power supplies ..... OB
Cue receivers ..... OC
DC to AC converters ..... OD
Remote mixing equipment ..... OE
Transmitters ..... OF

American Communications Corp., 306 Broadway, New York, N.Y.—OA, OB, OD, OE, OF
American Electroneering Co., 5025 19 W. Jefferson Blvd., Los Angeles 16, Calif.—OA, OC, OE, OF
Arlington Electric Prods., Inc., 55 Vandam St., New York 13, N.Y.—OA
Bell Sound Systems, Inc., 555 Marion Rd., Columbus 7, Ohio—OA
Bendix Aviation Corp., Red Bank Division, Red Bank, N.J.—OD
BERLANT ASSOCIATES, 4917 W. Jefferson Blvd., Los Angeles 16, Calif.—OA, OE
Bogen Co., David, 663 Broadway, New York 12, N.Y.—OE
Brociner Electronics Laboratory, 1546 Second Ave., New York 28, N.Y.—OA, OB
Bunnell & Co., J. H., 81 Prospect St., Brooklyn 1, N.Y.—OA, OE, OF
Carter Motor Co., 2644 N. Maplewood Ave., Chicago 47, Ill.—OD
Coax-Electronics Co., 1524 E. 15th St., Brooklyn 30, N.Y.—OE
Collins Radio Co., 855 35th St., N.E. Cedar Rapids, Iowa OA, OE
Daven Co., 191 Central Ave., Newark, N.J.—OE
Drake Co., R. L., 11 Longworth St., Dayton, Ohio—OB
FEDERAL TELECOMMUNICATION LABORATORIES, INC., 500 Washington Ave., Nutley 10, N.J.—OE
GATES RADIO CO., Quincy, Ill.—OA, OC, OD, OE, OF
Gaveco Laboratories, Inc., 2 East End Ave., New York 21, N.Y.—OE
GENERAL ELECTRIC CO., ELECTRONICS DEPT., Syracuse, N.Y.—OA, OC, OE, OF
Gulton Mfg. Corp., 212 Durham Ave., Metuchen, N.J.—OA
Hamilton Electronics, 2726 Pratt Ave., Chicago 45, Ill.—OA, OC, OE
Highland Engineering Co., Main & Urban Sts., Westbury, L.I., N.Y.—OA
Holub Industries, Inc., Sycamore, Ill.—OB
Jamaica Television Mfg. Co., 95-26 Sutphin Blvd., Jamaica 4, L.I., N.Y.—OA, OC, OD, OF
Lionel Corp., Irvington, N.J.—OA
Loge, Sound Engineers, J. M., 2171 W. Washington Blvd., Los Angeles 18, Calif.—OA
McIntosh Laboratory, Inc., 320 Water St., Binghamton, N. Y.—OA
Mallory & Co., Inc., P. R., 3029 E. Washington St., Indianapolis 1, Ind.—OB, OE
National Inter-Communicating Systems, 1531 Devon Ave., Chicago 26, Ill.—OA, OC, OE
Neptune Electronics Co., 433 Broadway, New York 13, N.Y.—OA, OE
Newcomb Audio Prods. Co., 6824 Lexington Ave., Hollywood, 38, Calif.—OA
Olesen Co., Otto K., 1534 Cahuenga Blvd., Hollywood 28, Calif.—OA, OC, OE
Onan & Sons, D. W., 3264 University Ave., Minneapolis 14, Minn.—OE
Opad-Green Co., 71 Warren St., New York 7, N.Y.—OB
Orthon Corp., 196 Albion Ave., Paterson 2, N.J.—OA, OD
Pan-Electronics Co., 290 Bonner Pl., New York 56, N. Y.—OA
Pentron Corp., 221 E. Cullerton St., Chicago 16, Ill.—OA
Philco Corp., Tioga & C Sts., Philadelphia 34, Pa.—OD, OF
Precise Development Corp., 999 Longbeach Rd., Oceanside, N. Y.—OA
Precision Electronics, 641 Milwaukee Ave., Chicago 22, Ill.—OA
PRESTO RECORDING CORP., P. O. Box 500, Hackensack, N.J.—OA, OC
RADIO CORP. OF AMERICA, RCA VICTOR DIV., Camden, N.J.—OA, OC, OD, OE, OF
RADIO ENGINEERING LABORATORIES, INC., 36-40 37th St., Long Island City 1, N.Y.—OF
Reeves-Hoffman Corp., 321 Cherry St., Carlisle, Pa.—OA, OC, OF
Rowe Industries, 1702 Wayne St., Toledo 9, Ohio—OA
Shrader Mfg. Co., 2803 M. Street, N. W., Washington D.C.—OA, OB, OE
Sierra Electronic Corp., 1050 Brittan Ave., San Carlos, Calif.—OF
Simpson Mfg. Co., Mark, 32-28 49th St., Long Island City 3, N.Y.—OA
Sonar Radio Corp., 59 Myrtle Ave., Brooklyn 1, N.Y.—OA, OF
Stephens Mfg. Corp., 8538 Warner Dr., Culver City, Calif.—OA, OB, OF
Stromberg-Carlson Co., 100 Carlson Rd., Rochester 3, N.Y.—OA
Synchrotone Film Sound, Inc., 1776 Broadway, New York 19, N.Y.—OC
Telectro Industries Corp., 35-16 37th St., Long Island City 1, N.Y.—OA
Thordarson-Meissner Mfg. Div. Maguire Industries, Inc., 500 W. Huron St., Chicago 10, Ill.—OA, OE
U. S. Recording Co., 1121 Vermont Ave., N.W., Washington 5, D.C.—OA, OC
Vokar Corp., 7300 Huron River Dr., Dexter, Mich.—OD
Webster Electric Co., 1900 Clark St., Racine, Wisc.—OA
Western Sound & Electric Labs., 805 S. 5th St., Milwaukee, Wisc.—OA, OC
Weston Laboratories, 410 Glen Rd., Weston 93, Mass.—OE

REPRODUCING & RECORDING EQUIPMENT

18—Disc

Complete recorders, portable ..... QA
Complete recorders, studio ..... QB
Cutting mechanisms ..... QC
Lathes ..... QD
Microscopes ..... QE
Motors ..... QF
Multispeed turntables ..... QG
Pickup arms ..... QH
Playback units ..... QS
Record changers ..... QI
Record mfg. equipment ..... QJ
Recording amplifiers ..... QK
Recording heads ..... QL
Recording turntables ..... QM
Reproducing heads ..... QN
Synchronized equipment ..... QO
Transcription players ..... QP
Turntable bases ..... QR

Alliance Mfg. Co., Lake Park Blvd., Alliance, Ohio—QF, QG

Allied Recording Products Co., 21-09 43rd Ave., Long Island City 1, N. Y.—QC, QD, QE, QM, QP

Astatic Corp., Harbor & Jackson Sts., Conneaut, Ohio—QH, QL, QN

Audak Co., 500 Fifth Ave., New York, N. Y.—QC, QH, QL, QN

Audio Industries, Michigan City, Ind.—QA

Audio Master Corp., 341 Madison Ave., New York 17, N. Y.—QI, QJ, QP

Autocrat Radio, Skokie, Ill.—QS

Baldor Electric Co., 4351 Duncan Ave., St. Louis, Mo.—QF

Barber & Howard, East Ave., Westerly, R. I.—QN

Bausch & Lomb Optical Co., 635 St. Paul St., Rochester 2, N. Y.—QE

Beam Radionics Corp., 224 N. Desplaines St., Chicago 6, Ill.—QG

Bell Sound Systems, Inc., 555 Marion Rd., Columbus 7, Ohio—QA, QK

Berger Communications, 109-01 72nd Rd., Forest Hills, L. I., N. Y.—QA, QB

Berkeley Custom Electronics, 2571 Shattuck Ave., Berkeley 4, Calif.—QH, QI, QK

Bodine Electric Co., 2254 W. Ohio St., Chicago 12, Ill.—QF

Bogen Co., David, 663 Broadway, New York 12, N. Y.—QP

Brush Development Co., 3405 Perkins Ave., Cleveland 14, Ohio—QC, QL

Buhl Optical Co., 1009 Beech Ave., Pittsburgh 12, Pa.—QE

Califone Corp., 1041 N. Sycamore Ave., Hollywood 38, Calif.—QP

Caltron Products Co., 1406 S. Hobart Blvd., Los Angeles 6, Calif.—QA, QH, QK, QL

Carron Mfg. Co., 741 W. Harrison St., Chicago 7, Ill.—QF, QL

Cinema Engineering Co., 1510 W. Verdugo Ave., Burbank, Calif.—QD, QK

CLARKSTAN CORP., 11921 W. Pico Blvd., Los Angeles 64, Calif.—QE, QH, QN

Coax Electronics Co., 1524 E. 15th St., Brooklyn 30, N. Y.—QK

Collins Audio Products Co., P. O. Box 368, Westfield, N. J.—QP

Crestwood Recorder Corp., 221 N. LaSalle St., Chicago 1, Ill.—QA

Cyclohm Motor Corp., Div. Howard Industries, Racine, Wisc.—QF

Daystrom Electric Corp., 837 Main St., Poughkeepsie, N. Y.—QA, QL, QN

Eastern Air Devices, Inc., 585 Dean St., Brooklyn 17, N. Y.—QF

Electric Specialty Co., 211 South St., Stamford, Conn.—QF

Electronic Creations Co., 367 Greenwich St., New York, N. Y.—QS

Electronics Contracting Co., 122 Chambers St., New York 7, N. Y.—QA, QK

Electro-Voice, Inc., Carroll & Cecil Sts., Buchanan, Mich.—QH

Fairchild Recording Equipment Corp., 154th St. & 7th Ave., Whitestone, N. Y.—QA, QB, QC, QD, QE, QF, QG, QH, QK, QL, QM, QN, QO, QP, QR

Gale Dorothea Mechanisms, 81-01 Broadway, Elmhurst, L. I., N. Y.—QG, QO

Garrard Sales Corp., 164 Duane St., New York 13, N. Y.—QI

GATES RADIO CO., Quincy, Ill.—QA, QB, QC, QD, QE, QH, QK, QL, QN

GENERAL ELECTRIC CO., ELECTRONICS DEPT., Syracuse, N. Y.—QH, QN

General Industries Co., Olive & Taylor Sts., Elyria, Ohio—QA, QC, QF, QG, QM

General Instrument Co., 829 Newark Ave., Elizabeth, N. J.—QG, QI

Gray Research & Development Co., 16 Arbor St., Hartford, Conn.—QH

Grem Engineering Co., 206 8th Ave., Brooklyn 15, N. Y.—QA, QB, QK

Guernet Electrical Machinery Inc., Box 196, Meriden, Conn.—QF

Hamilton Electronics, 2726 Pratt Ave., Chicago 45, Ill.—QK

Highland Engineering Co., Main & Urban St., Westbury, L. I., N. Y.—QK

Holtzer-Cabot, 125 Amory St., Boston 19, Mass.—QF

Libra Film Distributors, 6525 Sunset Blvd., Hollywood 28, Calif.—QA, QE, QK

Lincoln Engineering Co., 5701 Natural Bridge Ave., St. Louis 20, Mo.—QI

LINDBERG INSTRUMENT CO., 830 Folger Ave., Berkeley 2, Calif.—QN

Livingston Electronic Corp., Livingston, N. Y.—QH

McClure Talking Pictures, O. J., 1115 W. Washington Blvd., Chicago 7, Ill.—QP

Magnetic Motors Corp., Fox Island Rd., Portchester, N. Y.—QF, QP

Mannon Sound Stages Inc., 112 W. 89th St., New York 24, N. Y.—QE, QK

Marble Card Electric Co., Gladstone 1, Mich.—QF

Merix Chemical Co., 1021 E. 56th St., Chicago 15, Ill.—QJ

Micro Engineering Corp., 15 E. Tujunga Ave., Burbank, Calif.—QA, QB, QE

Miles Reproducer Co., 812 Broadway, New York 3, N. Y.—QA, QK, QL, QN

Milwaukee Stamping Co., 800 S. 72nd St., Milwaukee, Wisc.—QI

MP Concert Installations, Fairfield 10, Conn.—QK

Newcomb Audio Products Co., 6824 Lexington Ave., Hollywood 38, Calif.—QP

Oak Mfg. Co., 1260 Clybourn Ave., Chicago, Ill.—QI

Olesen Co., Otto K., 1534 Cahuenga Blvd., Hollywood 28, Calif.—QG, QH, QK, QM, QN, QP, QR

Onan & Sons, D. W., 3264 Royalston Ave. N., Minneapolis 5, Minn.—QB

Pan-Electronics Co., 290 Bonner Pl., New York 56, N. Y.—QA, QB

Peirce Wire Recorder Corp., 1328 Sherman, Evanston, Ill.—QL, QN

Pentron Corp., 221 E. Cullerton St., Chicago 16, Ill.—QA, QB, QK, QL, QN

Pickering & Co., 309 Woods Ave., Oceanside, N. Y.—QH, QN

Poinsettia Co., 104 Cedar Ave., Pitman, N. J.—QJ

Precision Electronics Inc., 641 Milwaukee Ave., Chicago 22, Ill.—QK

PRESTO RECORDING CORP., P. O. Box 500, Hackensack, N. J.—QA, QB, QC, QH, QK, QL, QM, QN, QO, QP, QR

QRK Electronic Products, 445 N. Circle Dr., Fresno 4, Calif.—QF, QG, QM

RADIO CORP. OF AMERICA, RCA-VICTOR DIV., Camden, N. J.—QA, QB, QC, QD, QE, QH, QK, QL, QN

Radio-Music Corp., 84 S. Water St., Port Chester, N. Y.—QG, QH, QM, QN, QO, QP, QR

Radio Recorders Equipment Co., 7000 Santa Monica Blvd., Hollywood 38, Calif.—QA, QB, QC, QD, QG, QH, QI, QK, QL, QM, QN, QO, QP, QR

Rangertone, Inc., 73 Winthrop St., Newark, N. J.—QO

Raytheon Mfg. Co., Willow St., Waltham, Mass.—QL, QO

Redmond Co., Owosso, Mich.—QF

Rek-O-Kut Co., 38-01 Queens Blvd., Long Island City 1, N. Y.—QA, QC, QD, QF, QK, QM, QP

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Robinson Recording Labs., 35 S. 9th St., Philadelphia 7, Pa.—QB, QC, QD, QH, QP
Scully Machine Co., 62 Walter St., Bridgeport 8, Conn.—QA, QB, QC, QD, QM
SHURE BROS., INC., 225 W. Huron St., Chicago 10, Ill.—QH, QN
Simpson Mfg. Co., Mark, 32-28 49th St., Long Island City 3, N. Y.—QA, QK, QP
Small Motors, Inc., 2076 Elston Ave., Chicago 14, Ill.—QF
Sonar Radio Corp., 59 Myrtle Ave., Brooklyn 1, N. Y.—QK
Sonotone Corp., Box 200, Elmsford, N. Y.—QN
Sound Inc., 221 E. Cullerton St., Chicago 16, Ill.—QL, QN
Sound Projects Co., 2810 W. Harrison St., Chicago 12, Ill.—QN
Soundscriber Corp., 146 Munson St., New Haven 4, Conn.—QA, QB
Speak-O-Phone Recording & Equipment Co., 23 W. 60th St., New York 23, N. Y.—QB, QK
Stephens Mfg. Corp., 8538 Warner Drive, Culver City, Calif.—QK
Sterling Electric Motors, 5401 Anaheim-Telegraph Rd., Los Angeles 22, Calif.—QF
Sterling Electronic Labs., 151 E. 70th St., New York 21, N. Y.—QH, QR
Telectro Industries Corp., 35-16 37th St., Long Island City 1, N. Y.—QK
Tetrad Corp., 62 St. Mary St., Yonkers, N. Y.—QH
Thordarson-Meissner Mfg. Co., Maguire Industries, Inc., 500 W. Huron St., Chicago 10, Ill.—QK
Turner Co., 909 17th St. N.E., Cedar Rapids, Iowa—QE
U. S. Motor Co., 200 E. Slauson Ave., Los Angeles 11, Calif.—QF
U. S. Recording Co., 1121 Vermont Ave., N.W., Washington 5, D. C.—QA, QB, QC, QD, QE, QH, QK, QL, QM
Universal Broadcast Equipment Co., 6035 Northwest Highway, Chicago 31, Ill.—QN
Van Eps Laboratories, Fred, R. D. 2, Plainfield, N. J.—QB, QC, QD, QE, QL
V-M Corp., 280 Park St., Benton Harbor, Mich.—QG, QI
Webster Electric Co., Racine, Wisc.—QH, QN
Western Sound & Electric Labs., 805 S. 5th St., Milwaukee, Wisc.—QK
White Rock Mfg. Corp., White Rock, S. Car.—QA
Wilcox Gay Corp., Charlotte, Mich.—QA
Williams, Brown & Earle, Inc., 918 Chestnut St., Philadelphia 7, Pa.—QE, QM
W-N Recorder Corp., 130 W. 46th St., New York 19, N. Y.—QA

19—Tape

Mechanisms ..... RA
Power supplies ..... RB
Recorders, miniature portable ..... RC
Recorders, portable ..... RD
Recorders, studio ..... RE
Recording amplifiers ..... RF
Recording heads ..... RG
Special equipment ..... RH
Synchronized equipment ..... RI
Tape indexer ..... RJ

Accurate Engineering Co., 2005 Blue Island Ave., Chicago 8, Ill.—RB
American Electroneering Co., 5025-19 W. Jefferson Blvd., Los Angeles 16, Calif.
American Hydromath Corp., 145 W. 57th St., New York 19, N. Y.—RH
American Television & Radio Co., 300 E. 4th St., St. Paul 1, Minn.—RB
AMPEX ELECTRIC CORP., 934 Charter St., Redwood City, Calif.—RA, RB, RD, RE, RF, RH, RI
Amplifier Corp. of America, 398 Broadway, New York 13, N. Y.—RA, RB, RD, RE, RF, RG, RH, RI
Ampro Corp., 2835 N. Western Ave., Chicago 18, Ill.—RD
Arc Radio Corp., 523 Myrtle Ave., Brooklyn 5, N. Y.—RD, RF
Audiograph Co., 1414 El Camino Real, San Carlos, Calif.—RD, RE, RF
Audio-Master Corp., 341 Madison Ave., New York 17, N. Y.—RD
AUDIO & VIDEO PRODUCTS CORP., 730 Fifth Ave., New York 19, N. Y.—RD
Bell Sound Systems, Inc., 555 Marion Rd., Columbus 7, Ohio—RD, RF
Berkeley Custom Electronics, 2571 Shattuck Ave., Berkeley 4, Calif.—RD, RH
BERLANT ASSOCIATES, 4917 W. Jefferson Blvd., Los Angeles 16, Calif.—RD, RE
Beta Electric Corp., 333 E. 103rd St., New York 29, N. Y.—RB
Brociner Electronics Laboratory, 1546 Second Ave., New York 28, N. Y.—RB, RF
Brush Development Co., 3405 Perkins Ave., Cleveland 14, Ohio—RA, RB, RD, RE, RF, RG, RH
Califone Corp., 1041 N. Sycamore Ave., Hollywood 38, Calif.—RD, RE
Caltron Products Co., 1406 S. Hobart Blvd., Los Angeles 6, Calif.—RC, RD, RF
CAMERA EQUIPMENT CO., 1600 Broadway, New York 19, N. Y.—RC, RD, RE
Carron Mfg. Co., 741 W. Harrison St., Chicago 7, Ill.—RA, RC, RD, RG
Cinema Engineering Co., 1510 W. Verdugo Ave., Burbank, Calif.—RD, RE, RF
Cinetech Co., 106 West End Ave., New York 23, N. Y.—RB, RD, RE, RF
Cook Electric Co., 2700 Southport Ave., Chicago 14, Ill.—RD, RE
Crosby Enterprises, Bing, 9028 Sunset Blvd., Los Angeles 46, Calif.—RD, RE
Daco Machine & Tool Co., 202 Tillary St., Brooklyn 1, N. Y.—RA, RC, RG
Designers for Industry, Inc., 2915 Detroit Ave., Cleveland 13, Ohio—RH
DuKane Corp., St. Charles, Ill.—RD
Eicor, Inc., 1501 W. Congress St., Chicago 7, Ill.—RA, RD
Electro Products Laboratories, 4501 N. Ravenswood Ave., Chicago 40, Ill.—RB
Electronic Creations Co., 367 Greenwich St., New York, N. Y.—RC
Fairchild Recording Equipment Corp., 154th St. & 7th Ave., Whitestone, N. Y.—RE, RH, RI
Feiler Engineering Co., 8026 Monticello Ave., Skokie, Ill.—RD, RF
GATES RADIO CO., Quincy, Ill.—RD, RE, RF
General Industries Co., Olive & Taylor Sts., Elyria, Ohio—RA, RD, RH
Grem Engineering Co., 206 8th Ave., Brooklyn 15, N. Y.—RD, RE
Hamilton Electronics, 2726 Pratt Ave., Chicago 45, Ill.—RF
Industrial Cinema Service, 4119 W. North Ave., Chicago 39, Ill.—RC, RD, RE
International Movie Producers' Service, 515 Madison Ave., New York 22, N. Y.—RD
Jensen Industries Inc., 329 S. Wood St., Chicago 12, Ill.—RG
Kepco Laboratories, Inc., 149-14 41st Ave., Flushing 55, N. Y.—RB
Lekas Mfg. Co., 111 S. 4th Ave., Ann Arbor, Mich.—RD, RE
Libra Film Distributors, 6525 Sunset Blvd., Hollywood 28, Calif.—RB, RD, RE, RF
Magnagram Corp., 11338 Burbank Blvd., N. Hollywood, Calif.—RF, RH, RI
MAGNECORD, INC., 360 N. Michigan Ave., Chicago 1, Ill.—RD, RE, RF, RG
Magnetic Recorders Co., 7124 Melrose Ave., Los Angeles 46, Calif.—RH
Mallory & Co., P. R., 3029 E. Washington St., Indianapolis 1, Ind.—RB
Mannon Sound Stages Inc., 112 W. 89th St., New York 24, N. Y.—RE
MELPAR, INC., 452 Swann Ave., Alexandria, Va.—RG
Micro Engineering Corp., 15 E. Tujunga Ave., Burbank, Calif.—RB, RD, RE, RF
Midco Mfg. Co., 607 N. 8th St., Sheboygan, Wisc.—RB
Miles Reproducer Co., 812 Broadway, New York 3, N. Y.—RC, RD, RF, RG
Minnesota Electronics Corp., 47 W. Water St., St. Paul 1, Minn.—RH

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#204 cartridge only with diamond needle $35.00 list

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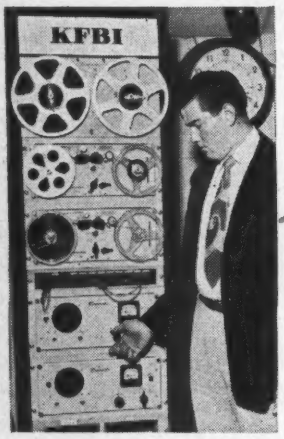

Minutes after being liberated from a Chinese Communist prison camp, this U. S soldier reports to Army Intelligence and to the world. Portable Magnecord tape recorders are on the spot to record his courageous words. Serving all over the world, Magnecorders undergo "battle-front" conditions and still continue to record with high fidelity and dependability the moment they are needed.

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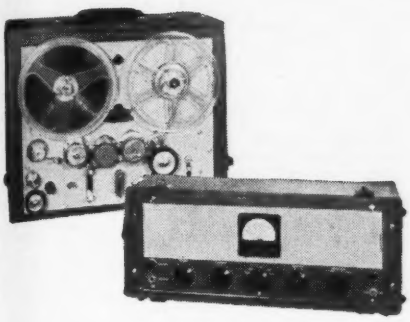
Olesen Co., Otto K., 1534 Cahuenga Blvd., Hollywood 28, Calif.—RF
Orthon Corp., 196 Albion Ave., Paterson 2, N. J.—RB
Pan-Electronics Co., 290 Bonner Pl., New York 56, N. Y. —RF
Pentron Corp., 221 E. Cullerton St., Chicago 16, Ill.—RA, RB, RC, RD, RE, RF, RG, RH, RI
PERM-O-FLUX CORP., 4900 W. Grand Ave., Chicago 39, Ill.—RD
Potter Instrument Co., 115 Cutter Mill Rd., Great Neck, N. Y.—RJ
Precise Development Corp., 999 Long Beach Rd., Oceanside, L. I., N. Y.—RB
Press Wireless Mfg. Co., Cantiague Rd., Hicksville, N. Y. —RJ
PRESTO RECORDING CORP., P. O. Box 500, Hackensack, N. J.—RA, RD, RE, RF, RG, RH
Process & Instruments, 60 Greenpoint Ave., Brooklyn 22, N. Y.—RC
RADIO CORP. OF AMERICA, RCA-VICTOR DIV., Camden, N. J.—RB, RD, RE, RF, RH
Radio Recorders Equipment Co., 7000 Santa Monica Blvd., Hollywood 38, Calif.—RA, RC, RD, RE, RF, RG, RH, RI
Rangertone, Inc., 73 Winthrop St., Newark 4, N. J.—RA, RB, RC, RD, RE, RF, RG, RH, RI, RJ
Recogram Recorders Co., 11338 Burbank Blvd., N. Hollywood, Calif.—RD, RE, RF, RH
REEVES SOUNDCRAFT CORP., 10 E. 52nd St., New York, N. Y.—RB
Revere Camera Co., 320 E. 21st St., Chicago 16, Ill. —RD
Rowe Industries, 1702 Wayne St., Toledo, Ohio—RA, RB, RE, RF
Shoup Engineering Co., 221 E. Cullerton, Chicago 16, Ill. —RD, RE, RF, RG, RH
SHURE BROS., INC., 225 W. Huron St., Chicago 10, Ill. —RG
Simpson Mfg. Co., Mark, 32-28 49th St., Long Island City 3, N. Y.—RD
Skiatron Electronics & Television Corp., 30 E. 10th St., New York 3, N. Y.—RH
Sonar Radio Corp., 59 Myrtle Ave., Brooklyn 1, N. Y.—RA, RB, RD, RF
Sound, Inc., 221 E. Cullerton St., Chicago 16, Ill.—RD, RF
Speak-O-Phone Recording & Equipment Co., 23 W. 60th St., New York 23, N. Y.—RD, RF
Stancil-Hoffman Corp., 1016 N. Highland Ave., Hollywood 38, Calif.—RA, RB, RC, RD, RE, RF, RG, RH, RI
Stephens Mfg. Corp., 8538 Warner Drive, Culver City, Calif.—RF
Synchrotone Film Sound, Inc., 1776 Broadway, New York 19, N. Y.—RD
Tape Recording Apparatus Co., Box 221, Caldwell, N. J. —RG, RH
Tapeton Mfg. Corp., 202 Tillary St., Brooklyn, N. Y.—RD
Tech Laboratories, Inc., Bergen & Edsall Blvds., Palisades Park, N. J.—RH
Telectro Industries Corp., 35-16 37th St., Long Island City 1, N. Y.—RA, RC, RD
U. S. Recording Co., 1121 Vermont Ave., N.W., Washington 5, D. C.—RB, RD, RE, RF
Universal Molded Products Corp., Bristol, Va.—RD
Van Cleef Bros., Inc., 7800 Woodlawn Ave., Chicago 19, Ill.—RB
Waveforms, Inc., 333 Sixth Ave., New York 14, N. Y. —RF
Webster-Chicago Corp., 5610 W. Bloomingdale Ave., Chicago 39, Ill.—RD, RE
Webster Electric Co., 1900 Clark St., Racine, Wisc.—RD
Wilcox-Gay Corp., Charlotte, Mich.—RD
Williams, Brown & Earle, Inc., 918 Chestnut St., Philadelphia 7, Pa.—RC
Wireway Corp. of America, 1331 Halsey St., Brooklyn 27, N. Y.—RA, RC, RD, RH

20—Wire

Recorders, miniature portable .....SA
Recorders, portable .....SB
Recorders, studio .....SC
Recording heads .....SE
Synchronized equipment .....SD

Aurex Corp., 1115 N. Franklin St., Chicago, Ill.—SB
Brush Development Co., 3405 Perkins Ave., Cleveland 14, Ohio—SB
CBS-Columbia, Inc., 170 53rd St., Brooklyn 32, N. Y. —SB, SC
Crescent Industries Inc., 5900 W. Touhy, Chicago 31, Ill.—SB
GATES RADIO CO., Quincy, Ill.—SB, SC
Geratron Products, 2115 N. Charles St., Baltimore 18, Md.—SB
Lear, Inc., 110 Ionia Ave., N.W., Grand Rapids 2, Mich. —SB, SC
Libra Film Distributors, 6525 Sunset Blvd., Hollywood 28, Calif.—SB, SC
Magnetic Corp. of America, 2518 W. Monroe St., Chicago 12, Ill.—SB, SC
Mannon Sound Stages Inc., 112 W. 89th St., New York 24, N. Y.—SC
Mohawk Business Machines Corp., 743 Fifth Ave., New York 22, N. Y.—SC
Molded Insulation Co., 335 E. Price St., Philadelphia, Pa.—SC
Peirce Wire Recorder Corp., 1328 Sherman, Evanston, Ill. —SA, SB
Pentron Corp., 221 E. Cullerton St., Chicago 16, Ill.—SA, SB, SC, SD
SHURE BROS., INC., 225 W. Horon St., Chicago 10, Ill. —SE
Telectro Industries Corp., 35-16 37th St., Long Island City 1, N. Y.—SA, SB

which of these famous PRESTO instruments meets your precision recording needs?



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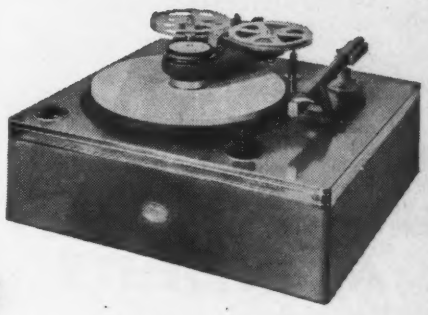
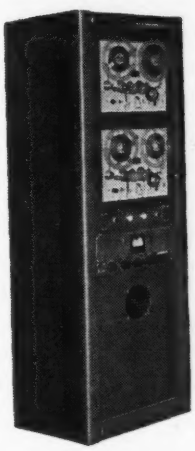
New and improved successor to the famous PT-900. Compact unit with three motors. No friction clutch or tension adjustments. High fidelity, constant speed at 7½"/sec. and 15"/sec. Instantaneous monitoring.



Turntable Tape Reproducer TL-10

Completely new idea in tape reproduction! Operates on any standard 16" turntable, is instantly removable. Turntable acts as motor. Speeds 7½"/sec. and 15"/sec. Plugs into speech input equipment. Professional performance, low cost.



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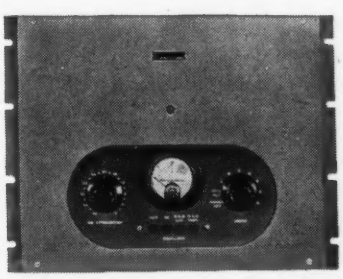
Complete monitoring unit for air traffic control, police radio and other systems. Speed: 1" per second. Can record continuously up to 8 hours.

Precision Disc Recorder 8 D-G

Dual motor; direct gear drive; 78 and 33⅓ rpm without deviation; 1-D cutting head (response to 10,000 cps). Seven feed pitches inside out and outside in.

Recording Amplifier 92-B

Power: 60 watts. Frequency response: 20 to 17,000 cps within 1 db. Push-button selection of recording characteristics. Mounts vertically in standard rack, front panel easily removable.



Portable Disc Recorder 6-N

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Tensolite Insulated Wire Co., Tarrytown, N. Y.—SA, SB, SC, SD

Webster-Chicago Corp., 5610 W. Bloomingdale Ave., Chicago 39, Ill.—SB, SC

Wireway Corp of America, 1331 Halsey St., Brooklyn 27, N. Y.— SA, SB

21—Film

Miniature recorders ..... TA

Recorders, magnetic

- **16 mm portable** ..... TB
- **16 mm studio** ..... TC
- **35 mm portable** ..... TD
- **35 mm studio** ..... TE
- **17.5 mm portable** ..... TF
- **17.5 mm studio** ..... TG

Recorders, photographic

- **16 mm portable** ..... TH
- **16 mm studio** ..... TI
- **35 mm portable** ..... TJ
- **35 mm studio** ..... TK

Recording Amplifiers ..... TZ

Synchronized equipment ..... TL

AMPEX ELECTRIC CORP., 934 Charter St., Redwood City, Calif.—TL

Amplifier Corp. of America, 398 Broadway, New York 13, N. Y.—TZ

BERNDT-BACH, INC., AURICON DIV., 7325 Beverly Blvd., Los Angeles 36, Calif.—TA, TH, TI, TL

Cinema Engineering Co., 1510 W. Verdugo Ave., Burbank, Calif.—TD, TE, TZ

Cinematic Developments & Cinechrome Lab., 2125 32nd Ave., San Francisco, Calif.—TC, TH, TI, TJ, TK, TL

Cinetech Co., 106 West End Ave., New York 23, N. Y.—TH, TI, TJ, TK, TZ

Colonial Films., 2118 Mass. Ave., N.W., Washington 8, D. C.—TH, TI

Daystrom Electric Corp., 837 Main St., Poughkeepsie, N. Y.—TD, TE

Feiler Engineering Co., 8026 Monticello Ave., Skokie, Ill. —TH, TZ

Hallen Corp., 3503 W. Olive, Burbank, Calif.—TB, TC, TD, TE, TF, TG, TL

Libra Film Distributors, 6525 Sunset Blvd., Hollywood 28, Calif.—TH, TI, TJ, TK, TZ

Magnagram Corp., 11338 Burbank Blvd., N. Hollywood, Calif.—TA, TB, TC, TD, TF, TG

Mannon Sound Stages, Inc., 112 W. 89th St., New York 24, N.Y.—TH, TI

Maurer, Inc., J. A., 37-01 31st St., Long Island City 1, N.Y.—TB, TC, TF, TG, TH, TI, TL

Micro Engineering Corp., 15 E. Tujunga Ave., Burbank, Calif.—TH, TI, TJ, TK, TZ

Miles Reproducer Co., 812 Broadway, New York 3, N.Y. —TB

Movie-Mite Corp., 1105 Truman Rd., Kansas City 6, Mo. —TB, TL

Pentron Corp., 221 E. Cullerton St., Chicago 16, Ill.—TA, TB, TC

RADIO CORP. OF AMERICA, RCA-VICTOR DIV., Camden, N. J.—TH, TI, TJ, TK, TZ

Radio Recorders Equipment Co., 7000 Santa Monica Blvd., Hollywood 38, Calif.—TH

S. O. S. CINEMA SUPPLY CORP., 602 W. 52nd St., New York 19, N. Y.—TJ, TK

Stancil-Hoffman Corp., 1016 N. Highland Ave., Hollywood 38, Calif.—TA, TB, TC, TD, TE, TF, TG, TL

Synchrotone Film Sound, Inc., 1776 Broadway, New York 19, N.Y.—TD, TE, TF, TG

TELECHROME, INC., 88 Merrick Rd., Amityville, N. Y. —TC

Telectro Industries Corp., 35-16 37th St., Long Island City 1, N.Y.—TZ

Thordarson-Meissner Mfg. Div., Maguire Industries, Inc., 509 W. Huron St., Chicago 10, Ill.—TZ

22—Graphic

Drives, electric ..... UA

Drives, flexible auto ..... UB

Drives, spring ..... UC

Recorders, fixed ..... UD

Recorders, portable ..... UE

Air Associates, Inc., Teterboro, N.J.—UA, UB, UC, UD, UE

Airborne Instruments Laboratory, 160 Old Country Rd., Mineola, N.Y.—UA

Alfax Paper & Engineering Co., P. O. Box 125, Westboro, Mass.—UD

AMPEX ELECTRIC CORP., 934 Charter St., Redwood City, Calif.—UD, UE

Audak Co., 500 Fifth Ave., New York 18, N.Y.—UD

Audio-Tone Oscillator Co., 237 John St., Bridgeport 3, Conn.—UD, UE

Boehme, Inc., H. O., 915 Broadway, New York, N.Y.—UA, UB, UD, UE

Brush Development Co., 3405 Perkins Ave., Cleveland 14, Ohio—UE

Clarke Instruments, 919 Jesup-Blair Dr., Silver Springs, Md.—UB

Edin Co., 207 Main St., Worcester 8, Mass.—UA, UD, UE

Electric Tachometer Corp., 2218 Vine St., Philadelphia 3, Pa.—UD

Esterline-Angus Co., P. O. Box 596, Indianapolis 6, Ind. —UA, UC, UD, UE

Fielden Electronics Inc., 1171 N.Y. Ave., Huntington Station, N.Y.—UD, UE

Gale Dorothea Mechanisms, 81-01 Broadway, Elmhurst, L.I., N.Y.—UA

Gorrell & Gorrell, Haworth, N.J.—UA, UB, UC, UD, UE

Hathaway Instrument Co., 1315 Clarkson St., Denver, Colo.—UD, UE

Heiland Research Corp., 130 E. 5th Ave., Denver 9, Colo. —UD, UE

Leupold & Stevens Instruments, 4445 N.E. Glisan St., Portland 13, Ore.—UD

MELPAR, INC., 452 Swann Ave., Alexandria, Va.—UA, UD

North American Philips Co., 100 E. 42nd St., New York 17, N.Y.—UD

Photron Instrument Co., 6516 Detroit Ave., Cleveland 2, Ohio—UD

Sanborn Co., 39 Osborn St., Cambridge 39, Mass.—UD, UE

Sound Apparatus Co., Stirling, N.J.—UD, UE

Stewart Mfg. Corp., F. W., 4311-13 Ravenswood Ave., Chicago 13, Ill.—UB

U. S. Gauge Div., American Machine & Metals Inc., Sellersville, Pa.—UD, UE

Zernickow Co., O., 15 Park Row, New York 17, N.Y.—UE

23—Supplies

Anti-static devices ..... VA

Cutting needles ..... VB

Discs VC

Film ..... VD

Miscellaneous ..... VE

Motion picture film reels and cans ..... VF

Paper rolls ..... VG

Playback needles ..... VO

Reproducing needles ..... VH

Tape VI

Tape erasers ..... VJ

Tape reels and flanges ..... VK

Tape splicers VL

Wire ..... VM

Ace Electric Mfg. Co., 1458 Shakespeare Ave., New York 52, N.Y.—VF

Acton Co., H. W., Nashua, N.H.—VB, VH

Advance Insulated Wire & Cable Co., 72 Woolsey St., Irvington 11, N.J.—VM

Advance Recording Products Co., 36-12 34th St., Long Island City 1, N.Y.—VC

Aeronautical Radio Mfg. Co., 155 First St., Mineola, N.Y.— VA, VM

Allied Recording Products Co., 21-09 43rd Ave., Long Island City 1, N.Y.—VC

American Electric Cable Co., 181 Appleton St., Holyoke, Mass.—VM

Amplifier Corp. of America, 398 Broadway, New York 13, N.Y.—VI

Ansco Div., General Aniline & Film Corp., Binghamton, N.Y.—VD

Astatic Corp., Harbor & Jackson Sts., Conneaut, Ohio—VH

AUDIO DEVICES, INC., 444 Madison Ave., New York 22, N.Y.—VC, VD, VI, VK

Audio-Master Corp., 341 Madison Ave., New York 17, N.Y.—VI

Brand and Co., William, North and Valley Sts., Willimantic, Conn.—VM

Brumberger Sales Corp., 34 34th St., Brooklyn 32, N.Y. —VE, VF

Brush Development Co., 3405 Perkins Ave., Cleveland 14, Ohio—VI, VM

Caltron Products Co., 1406 S. Hobart Blvd., Los Angeles 6, Calif.—VB, VC, VH

CAMERA EQUIPMENT CO., 1600 Broadway, New York 19, N. Y.—VF

Cinema Engineering Co., 1510 W. Verdugo Ave., Burbank, Calif.—VE, VF

Cineratic Developments & Cinechrome Lab., 2125 32nd Ave., San Francisco 16, Calif.—VD, VF

CLARKSTAN CORP., 11921 W. Pico Blvd., Los Angeles 64, Calif.—VE, VH

Colonial Films, 2118 Mass. Ave., N.W., Washington 8, D.C.—VD

Compco Corp., 2251 W. St. Paul Ave., Chicago 47, Ill. —VF, VK

Cornish Wire Co., 50 Church St., New York 7, N.Y.—VM

Crosby Enterprises, Bing, 9028 Sunset Blvd., Los Angeles 46, Calif.—VI

Cummins Business Machines Corp., 4740 Ravenswood Ave., Chicago 40, Ill.—VE

Daystrom Electric Corp., 837 Main St., Poughkeepsie, N.Y.—VD

Diamond Phonograph Needle, Div. Royal Diamond Tool Co., 172 Green St., Boston 30, Mass.—VB, VH

Diamond Wire & Cable Co., 380 Harvester St., Syracuse, Ill.—VM

Dielectric Materials Co., 5315-17 N. Ravenswood Ave., Chicago 40, Ill.—VM

Radio-Frequency Nomenclature

Low-Frequency 100-550 kilocycles

Broadcast Band 550-1600 kilocycles

High-Frequency 1.6-30 megacycles

Very-High (VHF) 30-300 megacycles

Ultra-High (UHF) 300-3000 megacycles

Super-High (SHF) 3000-100,000 MC.

Duotone Co., Locust St., Keyport, N.J.—VB, VC, VH, VI
DuPont de Nemours & Co., E. I., 10th & Market Sts., Wilmington 98, Dela.—VD
Eastman Kodak Co., 343 State St., Rochester 4, N.Y. —VD, VF
Edin Co., 207 Main St., Worcester 8, Mass.—VG
Electrovox Co., 60 Franklin St., E. Orange, N.J.—VA, VB, VH
Essex Wire Corp., 1601 Wall St., Ft. Wayne 6, Ind.—VM
Fairchild Recording Equipment Corp., 154 St. & 7th Ave., Whitestone, N.Y.—VB, VH, VI, VK
Federal Sapphire Products Co., Box 245, Fair Lawn, N.J. —VH
Fidelitone, Inc., 1616 Devon Ave., Chicago 26, Ill.—VI, VM
Film Research Associates, 150 E. 52nd St., New York 22, N.Y.—VF
GATES RADIO CO., Quincy, Ill.—VB, VC, VH, VI, VM
Gatti, Inc., Aurele M., 524 E. Washington St., Trenton 9, N.J.—VH
General Cement Mfg. Co., 919 Taylor Ave., Rockford, Ill.—VI, VM
Goldberg Bros., 1745 Wazee St., Denver, Colo.—VF
Gorrell & Gorrell, Haworth, N.J.—VG
Holuw Industries Inc., Sycamore, Ill.—VE
Indiana Steel Products Co., Valparaiso, Ind.—VI
Industrial Cinema Service, 4119 W. North Ave., Chicago 39, Ill.—VD, VF, VI, VM
International Movie Producers' Service, 515 Madison Ave., New York 22, N.Y.—VD, VI
Jefrona Laboratories, 1007 S. Salina St., Syracuse, N.Y. —VN
Jensen Industries Inc., 329 S. Wood St., Chicago 12, Ill.—VB, VH, VI, VK, VL
Kin-O-Lux, Inc., 105 W. 40th St., New York 18, N.Y. —VD
Knickerbocker Annunciator Co., 75 Murray St., New York 7, N.Y.—VM
Libra Film Distributors, 6525 Sunset Blvd., Hollywood 28, Calif.—VB, VC, VD, VH, VI, VM
Magnagram Corp., 11338 Burbank Blvd., N. Hollywood, Calif.—VG, VL
Magnecessories, P. O. Box 6960, Washington 20, D.C. —VL
Merix Chemical Co., 1021 E. 55th St., Chicago 15, Ill.—VA
Miller Mfg. Co., M. A., 1165 E. 43rd St., Chicago 15, Ill.—VB, VH
Minnesota Electronics Corp., 47 W. Water St., St. Paul 1, Minn.—VJ
Minnesota Mining & Mfg. Co., 900 Fauquier Ave., St. Paul 6, Minn.—VD, VI, VK
Mystik Adhesive Products, 2635 N. Kildare Ave., Chicago 39, Ill.—VE
Neumade Products Corp., 330 W. 42nd St., New York 18, N.Y.—VF
North American Philips Co., 100 E. 42nd St., New York 17, N.Y.—VB, VI
Orradio Industries, Inc., T-120 Marvyn Rd., Opelika, Ala. —VI
Peerless Film Processing Corp., 165 W. 46th St., New York 19, N.Y.—VF
Pentron Corp., 221 E. Cullerton St., Chicago 16, Ill.—VI, VJ, VM
Permo, Inc., 6415 Ravenswood Ave., Chicago 26, Ill.—VB, VH, VI, VM
Pfanstiehl Chemical Co., 104 Lakeview Ave., Waukegan, Ill.—VH
Phonograph Needle Mfg. Co., 42 Dudley St., Providence 5, R.I.—VH
Plastoid Corp., 42-61 24th St., Long Island City 1, N.Y.—VM
PRESTO RECORDING CORP., Box 500, Hackensack, N. J.—VB, VC, VH
RADIO CORP. OF AMERICA, RCA-VICTOR DIV., Camden, N. J.—VB, VI
Radio-Music Corp., 84 S. Water St., Port Chester, N.Y. —VH
Radio Recorders Equipment Co., 7000 Santa Monica Blvd., Hollywood 38, Calif.—VC, VI, VJ, VK, VL
Recordisc Corp., 395 Broadway, New York 13, N.Y.—VB, VC, VH, VI, VM
Recoton Corp., 251 Fourth Ave., New York 10, N.Y.—VB, VC, VI, VO
REEVES SOUNDCRAFT CORP., 10 E. 52nd St., New York 22, N. Y.
Rockbestos Products Corp., 285 Nicoll St., New Haven 4, Conn.—VM
Rupp's Assembling & Mfg. Works, 2341 N. Seminary Ave., Chicago 14, Ill.—VM
Sonic Recording Products, Inc., 58 Mill Rd., Freeport, L.I., N.Y.—VC
Sound Apparatus Co., Stirling, N.J.—VG
Sound Devices, Inc., 160 E. 116th St., New York 29, N.Y.—VB, VC, VH, VI
Speak-O-Phone Recording & Equipment Co., 23 W. 60th St., New York 23, N.Y.—VB, VC, VH, VI, VM
Srepco, Inc., 135 E. 2nd St., Dayton 2, Ohio—VE
Stancil-Hoffman Corp., 1016 N. Highland Ave., Hollywood 38, Calif.—VJ
Strandberg Recording Co., 705 Woodland Dr., Greensboro, N. Car.—VE
Tape Recording Apparatus Co., Box 221, Caldwell, N.J. —VH
Tayloreal Corp., 2 Commercial St., Rochester 14, N.Y. —VF
Tech Laboratories, Inc., Bergen & Edsall Blvds., Palisades Park, N.J.—VL
Telectro Industries Corp., 35-16 37th St., Long Island City 1, N.Y.—VK
Tensolite Insulated Wire Co., Tarrytown, N.Y.—VM
Tetrad Corp., 62 St. Mary St., Yonkers, N. Y.—VH
U.S. Rubber Co., 1230 Ave. of the Americas, New York, N.Y.—VM
Universal Reels, 9-16 37th Ave., Long Island City, N.Y. —VF

Performance of Germanium Diodes

United States production of germanium diodes for radio and electronic applications has expanded to something like 4 million a year. Yet because they are relatively new, germanium diodes have not received extensive service study, and few significant data on their characteristics in extended use have become available. Because it uses some 16,000 germanium diodes for computing and switching functions, with the requirement of very high reliability, the National Bureau of Standards Eastern Automatic Computer (SEAC) is a natural proving ground for the diodes. Of interest, therefore, are results from a recent preliminary study of experience with germanium diodes in the SEAC program, as shown in the following table.

Diode Failures in SEAC Service

June 1, to Nov. 1, 1950 (Approximately 2500 hours under voltage)

1. Failures detected during computer breakdown:

50 out of 12,000 or		0.4%

2. Replacements made after routine checks:

596 out of 12,000 or		5%
Excessive i_b	64	2⅔%
Excessive e_r	23	⅓%
Drift	154	1¼%
Open	2	1/60%
Unspecified	353	3.0%

Vallorbs Jewel Co., P. O. Box 958, Lancaster, Pa.—VH
Van Cleef Bros., Inc., 7800 Woodlawn Ave., Chicago 19, Ill.—VI
Van Eps Laboratories, Fred, R. D. 2, Plainfield, N.J.—VE
Williams, Brown & Earle, Inc., 918 Chestnut St., Philadelphia 7, Pa.—VD, VF, VI

24—Servo & Telemetering

Servo devices .....XA
Telemetering equipment .....XB

Airplane & Marine Instruments, Inc., Clearfield, Pa.—XA
Akeley Camera & Instrument Corp., 175 Varick St., New York 14, N.Y.—XA, XB
American Electroneering Co., 5025-19 W. Jefferson St., Los Angeles 16, Calif.—XA
Ampex Electric Corp., 934 Charter St., Redwood City, Calif.—XB
Antenna Research Laboratory, Inc., 797 Thomas Lane, Columbus 14, Ohio—XB
Applied Science Corp. of Princeton, P. O. Box 44, Princeton, N.J.—XB
Arlington Electric Products Inc., 55 Vandam St., New York 13, N.Y.—XA
Andio-Tone Oscillator Co., 237 John St., Bridgeport 3, Conn.—XA, XB
BENDIX AVIATION CORP., ECLIPSE-PIONEER DIVISION, Teterboro, N. J.—XA
Bendix Aviation Corp., Pacific Division, 11600 Sherman Way, N. Hollywood, Calif.—XA, XB
Berkeley Scientific Corp., 2200 Wright Ave., Richmond, Calif.—XB
Brush Development Co., 3405 Perkins Ave., Cleveland 14, Ohio—XB
Bunnel & Co., J. H., 81 Prospect St., Brooklyn 1, N.Y. —XA, XB
Canoga Corp., 14345 Bessemer St., Van Nuys, Calif.—XB
CGS Laboratories, 391 Ludlow St., Stamford, Conn.—XA, XB
Clarke Instruments, 919 Jesup-Blair Drive, Silver Springs, Md.—XB
Cook Electric Co., 2700 Southport Ave., Chicago 14, Ill. —XA
Crosby Enterprises, Bing, 9028 Sunset Blvd., Los Angeles 46, Calif.—XB
Daco Machine & Tool Co., 202 Tillary St., Brooklyn 1, N.Y.—XA
Designers for Industry, Inc., 2915 Detroit Ave., Cleveland 13, Ohio—XA
Electric Regulator Corp., 1938 Park Ave., New York 35, N.Y.—XA
Electro-Mechanical Research, Inc., 64 Main St., Ridgefield, Conn.—XB
Esterline-Angus Co., P. O. Box 596, Indianapolis 6, Ind. —XB
Flader, Inc., Frederic, 583 Division St., N. Tonawanda, N.Y.—XA, XB
Gaveco Laboratories, 2 East End Ave., New York 21, N.Y.—XA
GENERAL ELECTRIC CO., ELECTRONICS DEP'T., Syracuse, N.Y.—XA, XB
Giannini & Co., G. M., 285 W. Colo. St., Pasadena 1, Calif.—XA, XB
Glasscraft Co., 5210 E. Olympic Blvd., Los Angeles 22, Calif.—XA, XB
Hammarlund Mfg. Co., 460 W. 34th St., New York 1, N.Y.—XB
Harvey-Wells Electronics, Inc., North St., Southbridge, Mass.—XA, XB
Hastings Instrument Co., Super Highway & Pine Ave., Hampton, Va.—XB
HUGHES AIRCRAFT CO., Culver City, Calif.—XB
Industrial Control Co., Straight Path & Arlington Ave., Wyandanch, L.I., N.Y.—XA
Industrial Electronic Engineers, 5326 Sunset Blvd., Hollywood 27, Calif.—XA, XB
Ionic Electronic Equipment Co., 1705 N. Kenmore, Los Angeles 27, Calif.—XB
Ketay Mfg. Corp., 555 Broadway, New York 12, N.Y.—XA
Kollsman Instrument Corp., 80-08 45th Ave., Elmhurst, L.I., N.Y.—XA
Krohn-Hite Instrument Co., 580 Mass Ave., Cambridge 39, Mass.—XA, XB

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Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia 44, Pa.—XB
Leupold & Stevens Instruments, 4445 N.E. Gilsan St., Portland 13, Ore.—XA, XB
Lionel Corp., Irvington, N.J.—XA
Loral Electronics Corp., 794 E. 140th St., Bronx 54, N.Y.—XA, XB
Magnetic Devices Corp., 103 S. Van Brunt St., Englewood, N.J.—XA
Manufacturers Research Corp., 17 W. Mulberry St., Baltimore 1, Md.—XA, XB
MELPAR, INC., 452 Swann Ave., Alexandria, Va.—XA, XB
Minneapolis-Honeywell Regulator Co., 2712 4th Ave., S. Minneapolis, Minn.—XA, XB
MOTOROLA, INC., 4545 Augusta Blvd., Chicago 51, Ill. —XB
North American Instrument Co., 23 E. 26th St., New York 10, N.Y.—XA
Orthon Corp., 196 Albion Ave., Paterson 2, N.J.—XA, XB
Panoramic Radio Products, Inc., 10 S. 2nd Ave., Mount Vernon, N.Y.—XB
Philco Corp., Tioga & C Sts., Philadelphia 34, Pa.—XA, XB
Potter Instrument Co., 115 Cutter Mill Rd., Great Neck, N.Y.—XB
Press Wireless Mfg. Co., Cantiague Rd., Hicksville, N.Y. —XA
RADIO ENGINEERING LABORATORIES, INC., 36-40 37th St., Long Island City 1, N. Y.—XB
Rahm Instruments, Inc., 12 W. Broadway, New York 7, N.Y.—XB
Rangertone, Inc., 73 Winthrop St., Newark, N.J.—XA, XB
Raytheon Mfg. Co., Willow St., Waltham, Mass.—XA
Reeves Instrument Corp., 215 E. 91st St., New York 28, N.Y.—XA
Rosen Eng'g. Products, Raymond, 32nd & Walnut Sts., Philadelphia 4, Pa.—XB
Rowe Industries, 1702 Wayne St., Toledo 9, Ohio—XB
Schaevitz Engineering, Crescent Blvd. & Drexel Ave., Camden, N.J.—XA, XB
Servo Corp. of America, 2020 Jericho Turnpike, New Hyde Park, N.Y.—XA, XB
Servomechanisms, Inc., Post & Stewart Aves., Westbury, N.Y.—XA
Servo-Tek Products Co., 4 Godwin Ave., Paterson 1, N.J. —XA, XB
Skiatron Electronics & Television Corp., 30 E. 10th St., New York 3, N. Y.—XA, XB
Small Motors Inc., 2076 Elston Ave., Chicago 14, Ill.— XA
SPERRY GYROSCOPE CO., DIV. OF SPERRY CORP., Great Neck, N. Y.—XA
Square Root Mfg. Corp., 391 Saw Mill River Rd., Yonkers, N.Y.—XA, XB
Stancil-Hoffman Corp., 1016 N. Highland Ave., Hollywood 38, Calif.—XA, XB
Standard Electronic Research Corp., 2 East End Ave., New York 21, N.Y.—XA
SYLVANIA ELECTRIC PRODUCTS INC., 1740 Broadway, New York 19, N. Y.—XB
TELECHROME, INC., 88 Merrick Rd., Amityville, N. Y. —XA
Telectro Industries Corp., 35-16 37th St., Long Island City 1, N.Y.—XA, XB
Telemetering Associates, P. O. Box 6, Silver Spring, Md. —XB
Transicoil Corp., 107 Grand St., New York, N. Y.—XA
Transmitter Equipment Mfg. Co., 345 Hudson St., New York 14, N.Y.—XA
WESTINGHOUSE ELECTRIC CORP., CONSTRUCTION & COMMUNICATIONS SEC. 10-L, E. Pittsburgh, Pa.— XA, XB

25—Connectors & Cable

Cable	YT
Cable assemblies	YN
Cable clamps	YQ
Cable markers	YA
Coaxial cable	YB
Coaxial connectors	YC
Coaxial line terminations	YS
Coaxial Switches	YU
Connectors, multiple	YL
Jack panels	YD
Jacks, telephone and microphone	YM
Junction boxes	YR
Microphone connectors	YE
Patch cords	YF
Plugs	YG
Power connectors	YH
Reels, cable	YJ
Shielded cable	YI
Solderless terminals	YK
Terminal blocks	YP
Wire	YO

Acme Wire Co., 1255 Dixwell Ave., New Haven 14, Conn. —YO
Advance Insulated Wire & Cable Co., 72 Woolsey St., Irvington 11, N.J.—YB
Aeronautical Radio Mfg. Co., 155 First St., Mineola, N.Y.—YC, YG
Airplane & Marine Instruments, Inc., Clearfield, Pa.—YF
Airtron, Inc., 105 E. Elizabeth Ave., Linden, N.J.—YC, YN
Alden Prods. Co., 117 N. Main St., Brockton 64, Mass.— YC, YE, YG, YH, YI
Alpha Wire Corp., 430 Broadway, New York 13, N.Y.— YB, YI, YR
American Communications Corp., 306 Broadway, New York, N.Y.—YD, YG
American Electric Cable Co., 181 Appleton St., Holyoke, Mass.—YO, YR
AMERICAN PHENOLIC CORP., 1830 S. 54th Ave., Chicago 50, Ill.—YB, YC, YE, YF, YG, YH, YI, YK, YL, YN
Anaconda Wire & Cable Co., 25 Broadway, New York 4, N.Y.—YB, YO
ANDREW CORP., 363 E. 75th St., Chicago 19, Ill.— YB, YC, YD, YF, YG
Arlington Electric Prods. Inc., 55 Vandam St., New York 13, N.Y.—YD, YG
Astatic Corp., Harbor & Jackson Sts., Conneaut, Ohio— YC, YE, YG
Belden Mfg. Co., 4647 W. Van Buren St., Chicago 44, Ill.—YB, YI, YN, YO, YR
Bird Electronic Corp., 1800 E. 38th St., Cleveland 14, Ohio—YB
Bliss-Warren Electronic Corp., Sussex Airport, Sussex, N.J.—YN
Brady Co., W. H., 16 E. Spring St., Chippewa Falls, Wisc.—YA
Brand & Co., Wm., North & Valley Sts., Willimantic, Conn.—YA, YI
BREEZE CORPORATIONS, 41 S. 6th St., Newark, N. J. —YE, YL, YN
Bud Radio, Inc., 2118 E. 55th St., Cleveland 3, Ohio— YR
Buggie & Co., H. H. 726 Stanton St., Toledo 1, Ohio— YL
Burndy Engineering Co., 107 Buckner Blvd., New York 54, N.Y.—YL
CANNON ELECTRIC CO., 3209 Humboldt St., Los Angeles 31, Calif.—YC, YE, YG, YH, YL, YN
Capitol Stage Lighting Co., 527 W. 45th St., New York 19, N.Y.—YL
Carter Parts Co., 213 Institute Pl., Chicago 10, Ill.— YG, YM
Chase Brass & Copper Co., 236 Grand St., Waterbury 20, Conn.—YB, YI
CINCH MFG. CORP., 2460 W. George St., Chicago 18, Ill.—YG, YH, YK, YL, YP
Cinema Engineering Co., 1510 W. Verdugo Ave., Burbank, Calif.—YL, YN, YR
Clarke Instruments, 919 Jesup-Blair Drive, Silver Spring, Md.—YD, YF
Coil Winders, Inc., 61 Bergen St., Brooklyn 2, N.Y.— YD, YF
Coleman Cable & Wire Corp., 4515 W. Addison St., Chicago 41, Ill.—YB, YR
Commercial Plastics Co., Merchandise Mart, Chicago 54, Ill.—YQ
Communication Products Co., Marlboro, N.J.—YB
Connecticut Telephone & Electric Corp., 70 Britannia St., Meriden, Conn.—YD, YF
Cornish Wire Co., 50 Church St., New York 7, N.Y.—YI, YO, YR
Crescent Co., Div., Carol Cable, Box 260, Pawtucket, R.I. —YB, YI
DAGE ELECTRIC CO., 67 N. Second St., Beech Grove, Ind.—YC
Dial Light Co. of America, Inc., 900 Broadway, New York 3, N.Y.—YE, YI
Diamond Mfg. Co., 7 North Ave., Wakefield, Mass.—YL
Diamond Wire & Cable Co., 380 Harvester St., Sycamore, Ill.—YI
Dielectric Materials Co., 5315-17 N. Ravenswood Ave., Chicago 40, Ill.—YB, YI
Eby Inc., Hugh H., 4700 Stenton Ave., Philadelphia 44, Pa.—YG
Elco Corp., 190 W. Glenwood Ave., Philadelphia 40, Pa. —YG
Electrix Corp., 150 Middle St., Pawtucket, R. I.—YL
Electro Sales Co., 399 Atlantic Ave., Boston 10, Mass.— YR
Equipment & Service Co., 6815 Oriole Drive, Dallas 9, Texas—YG, YH
Essex Wire Corp., 1601 Wall St., Ft. Wayne 6, Ind.—YI
Etraco Mfg. Co., Woods Church Rd., Flemington, N. J. —YR
FEDERAL TELECOMMUNICATION LABORATORIES, INC., 500 Washington Ave., Nutley 10, N. J.—YB, YC, YD, YE, YF, YG, YH, YI
FEDERAL TELEPHONE & RADIO CORP., 100 Kingsland Rd., Clifton, N. J.—YB, YC, YI, YR
GATES RADIO CO., Quincy, Ill.—YL, YN, YR
General Cable Corp., 420 Lexington Ave., New York 17, N. Y.—YB
General Cement Mfg. Co., 919 Taylor Ave., Rockford, Ill. —YE
General Communications Co., 530 Commonwealth Ave., Boston 15, Mass.—YB, YU
GENERAL ELECTRIC CO., ELECTRONICS DEPT., Syracuse, N. Y.—YD, YL
General Radio Co., 275 Massachusetts Ave., Cambridge 39, Mass.—YB, YC, YF, YG
General RF Fittings Co., 702 Beacon St., Boston 15, Mass.—YC
Hermaseal Co., Elkhart 6, Ind.—YK
HERMETIC SEAL PRODUCTS CO., 33 S. 6th St., Newark 7, N. J.—YL
Holub Industries, Inc., Sycamore, Ill.—YH
Industrial Electric Works, 1509 Chicago St., Omaha, Nebr.—YJ, YR
Industrial Power & Equipment Co., 225 Broadmoor Ave., Pittsburgh 34, Pa.—YH
Insuline Corp. of America, 36-02 35th Ave., Long Island City 1, N. Y.—YE, YG
JOHNSON CO., E. F., 206 2nd Ave., S.W., Waseca, Minn. —YB
JONES, HOWARD B., DIV., CINCH MFG. CORP., 1026 S. Homan Ave., Chicago, Ill.—YC, YE, YG, YH, YL, YM
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa. —YG, YH, YL
Kamm Co., L. J., 40 W. 96th St., New York 25, N.Y. —YJ
Keystone Electronics Corp., 423 Broome St., New York 13, N.Y.—YD
Kings Electronics Co., 50 Marbledale Rd., Tuckahoe, N.Y. —YC, YL

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OCS—Oscillating color sequence
CPA—Color phase alternation, same as above
Flip-flop—Slang for OCS or CPA
Triniscope—Three-tube dichroic color-TV receiver
CCS—Constant color sequence

Kings Microwave Co., 50 Marbledale Rd., Tuckahoe, N.Y. —YC, YD, YF, YG, YH
Kliegl Bros., 321 W. 50th St., New York 19, N.Y.— YF, YG
Knickerbocker Annunciator Co., 75 Murray St., New York 7, N. Y.—YR
Legri S. Co., 158 W. 99th St., New York, N.Y.—YO
Lenz Electric Mfg. Co., 1751 N. Western Ave., Chicago 47, Ill.—YO
Libra Film Distributors, 6525 Sunset Blvd., Hollywood 28, Calif.—YL, YR
Link Radio Corp., 125 W. 17th St., New York 11, N. Y. —YL, YR
LIONEL CORP., Irvington, N. J.—YC, YD, YE
Magnetic Recorders Co., 7120 Melrose Ave., Los Angeles 46, Calif.—YL, YR
Midwest Automatic Control Co., 510 Third St., Des Moines 9, Iowa—YR
Millen Mfg. Co., James, 150 Exchange St., Malden 48, Mass.—YG, YH
Miles Reproducer Co., 812 Broadway, New York 3, N.Y. —YL, YR
Mines Equipment Co., 4262 Clayton Ave., St. Louis 10, Mo.—YC, YL
Mogull Co., Alexander, 161 Washington St., New York 6, N.Y.—YC, YE, YG, YH
Neal Co., 318 N. 18th St., Omaha 2, Nebr.—YJ
Neptune Electronics Co., 433 Broadway, New York 13, N.Y.—YL
Ney Co., J. M., 71 Elm St., Hartford 1, Conn.—YO
Okonite Co., Passaic, N.J.—YB, YI
Orthon Corp., 196 Albion Ave., Paterson 2, N.J.—YF, YH
Phalo Plastics Corp., 25 Foster St., Worcester 8, Mass. —YB, YI
Plastoid Corp., 42-61 24th St., Long Island City 1, N.Y. —YB
Precision Tube Co., 3828 Terrace St., Philadelphia 28, Pa.—YB
Product Development Co., 526 Elm St., Arlington, N.J. —YB, YC
RADIO CORP. OF AMERICA, RCA VICTOR DIV., Camden, N. J.—YL, YN, YR
Rapid Specialties Co., 525 W. Huron St., Chicago 10, Ill.—YL
Raypar, Inc., 7810 W. Addison Ave., Chicago 34, Ill.— YF
Roanwell Corp., 662 Pacific St., Brooklyn 17, N.Y.—YL
Rockbestos Products Corp., 285 Nicoll St., New Haven 4, Conn.—YB, YI
Runzel Cord & Wire Co., 4727 Montrose Ave., Chicago 41, Ill.—YF, YI
Rupp's Assembling & Mfg. Works, 2341 N. Seminary Ave., Chicago 14, Ill.—YR
Schott Co., Walter L., 3225 Exposition Pl., Los Angeles 18, Calif.—YL
Shaw Insulator Co., 160 Coit St., Irvington 11, N.J.— YP
Sherman Mfg. Co., H. B., 22 Burney St., Battle Creek, Mich.—YH
Standard Electric Time Co., 89 Logan St., Springfield 2, Mass.—YD, YF, YG
Switchcraft, Inc., 1328 N. Halsted St., Chicago 22, Ill. —YG, YM
Taffet Radio & Television Co., 2530 Belmont Ave., Bronx, 58, N. Y.—YR
Telectro Industries Corp. 35-16 37th St., Long Island City 1, N.Y.—YD, YG
Tensolite Insulated Wire Co., Tarrytown, N.Y.—YB, YI
Thompson Products, Inc., 2096 Clarkwood Rd., Cleveland 3, Ohio—YC
Topflight Tape Co., 52 S. Duke St., York, Pa.—YA
Transradio Ltd., 138A Cromwell Rd., London S.W. 7, England—YB
Trimm, Inc., 400 W. Lake St., Libertyville, Ill.—YD, YF, YG, YM
U.S. Rubber Co., Elect. Wire & Cable Dept., 1230 Ave. of the Americas, New York 20, N.Y.—YB, YG, YI
UNIVERSAL AVIATION CORP., 230 Park Ave., New York 17, N. Y.—YD
Univox Corp., 83 Murray St., New York 7, N. Y.—YB, YR
Vaco Prods. Co., 317 E. Ontario St., Chicago 11, Ill.— YK
WELLS SALES, INC., 833 W. Chicago Ave., Chicago 22, Ill.—YB, YC, YE, YF, YI
Western Electronic Enterprises, 3348 W. Compton Blvd., Gardena, Calif.—YC, YS
Western Insulated Wire Co., 1001 E. 62nd St., Los Angeles, Calif.—YR
Whitney Blake Co., New Haven 14, Conn.—YR
WORKSHOP ASSOCIATES, DIV. GABRIEL CO., 135 Crescent Rd., Needham Heights 94, Mass.—YC

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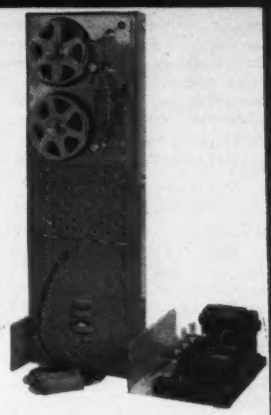
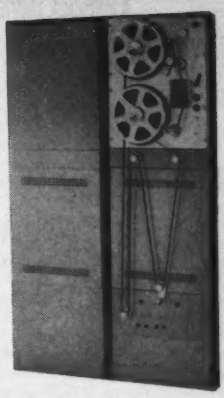


Multi-channel recorder for seismograph data recording in the field with remote control. Custom construction by AMPEX.



Multi-channel continuous loop reproducer. Custom construction by AMPEX.

MODEL 302 is designed specially to record all telemetering channels on the FM/FM system up to and including the 40 kc channel.

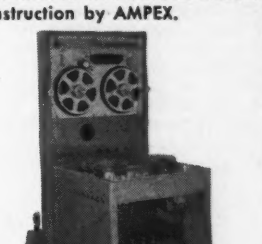
MODEL 303 is a pulse recorder designed to record and accurately reproduce pulse width modulated telemetering data. The input signal is converted to sharp pulses defining the leading and trailing edges of the square waves, which are recorded on the tape. The sharp pulses are reproduced and reconverted to square waves restoring the original pulse width modulation.

MODEL 307 is specially designed to record all telemetering channels including 70 kc channels.

MODEL 375 Precision Capstan Motor Amplifier provides an accurate source of 60-cycle power to drive the capstan motor of Model 300 series recorders, thereby providing constant tape speed independent of power line frequency variations. This unit consists of a precision, temperature-compensated tuning fork which drives a power amplifier with ample capacity to run the drive motor.

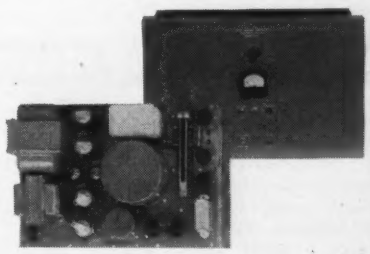
MODEL 381 Speed-Lock automatically adjusts the playback speed to insure that any recorded frequency is played back the same as it was recorded, regardless of tape dimensional changes, power line frequency changes, or slippage.

MODEL 500 Low Flutter and Wow of less than .1% peak to peak over the spectrum of 0 to 10,000 cycles is achieved by an exclusive-with-Ampex drive system. Complete specs and data describing this and all other special AMPEX equipment are available on request.

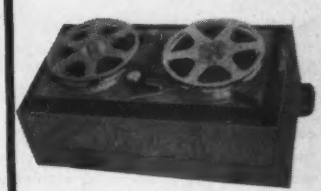


Multi-channel playback and auxiliary recorder for shock and vibration study. Custom construction by AMPEX.

Low frequency data recorder. Custom construction by AMPEX.



Model 375 Capstan Motor Power Amplifier; front and rear views.



Mobile multi-channel shock and vibration data recorder. Custom construction by AMPEX.

AUDIO & VIDEO PRODUCTS CORPORATION represents AMPEX ELECTRIC CORPORATION in the sale of Magnetic Tape Recording Equipment. We also maintain an engineering consultation service in the fields of telemetering and data recording. Please do not hesitate to make use of this service. There is no obligation or fee.

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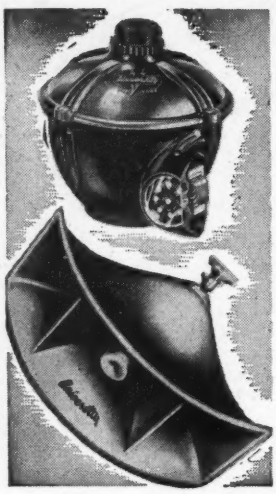
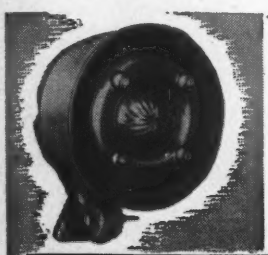
BREAKDOWN-PROOF DRIVER UNITS Model PA-30 embodies features developed by University and never successfully imitated. Ratings are conservative, and construction is to well known University standards which have made our drivers famous for their dependable performance. PA-30 is rated at 30 watts, with response 80-10,000 cps, and is the *first* to have a multi-tap built-in line matching transformer. Exclusive "rim centering" construction of mechanism and use of University "W" shaped Alnico V magnet insures high conversion efficiency, permanent voice coil alignment regardless of shock or vibrations. Weatherproofed throughout.



PAGING AND INTERCOM SPEAKERS These feature reflex air columns with hermetically sealed driver units. They are widely used for intercommunication and paging of all types. Efficiency is high and reproduction exceptional at any volume level. Directional, radial, or bi-directional types available. Weather-proof finishes permit use anywhere. Typical of University pace-setting design is the Cobra-12 illustrated, which provides optimum area coverage with minimum power input. Power rating is 12 watts, frequency response 250-10,000 cps, dispersion angle 60° x 120°. Swivel mounting bracket provides full flexibility.



SUBMERGENCE-PROOF SPEAKERS These types are designed for use where extreme ruggedness and immunity to spray, gases, live steam or dust are essential. Function even under water, drain automatically, operate continuously regardless of exposure. Models available for directional or radial projection, wall or bulkhead mounting, swivel mount and with or without built-in line matching transformer and attenuator. Design is ideal for railroad use, shipboard, industries, docks, rough mobile work, etc. Model MM-2, illustrated, is rated at 15 watts continuous IPM, frequency 300-6000 cps, impedance 16 ohms.

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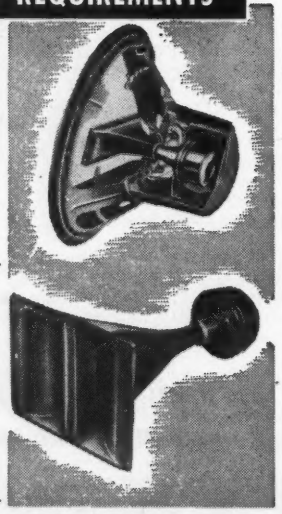
WIDE RANGE CONE SPEAKERS Model 6201 comprises a superb 12" cone speaker with a driver type tweeter mounted coaxially. The cone speaker features a 24 oz. "W" shaped Alnico magnet and edge treated cone for distortion-free low frequency response. Tweeter has wide angle horn. A built-in LC crossover network and external high frequency attenuator are included. Capacity is 25 watts, response 45-15,000 cps, impedance 8 ohms. Other cone speakers for high fidelity, as well as submergence-prop or blastproof service for commercial and military applications.



HI-FREQUENCY TWEETERS University offers a complete line of single and double tweeter units for both 2000 and 600 cycle crossover. Exclusive University "reciprocating flare" horn construction assures uniform wide angle dispersion. A complete line of accessories are included—crossover networks, adapter for mounting tweeter on a standard cone speaker, etc. These tweeters may be added to any standard amplifier and speaker to provide the finest in high fidelity reproduction—and at a very low cost.

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ALTEC LANSING CORP., 9356 Santa Monica Blvd., Beverly Hills, Calif.—ZA, ZC, ZD, ZG, ZH

American Communications Corp., 306 Broadway, New York, N. Y.—ZG

American Electric Cable Co., 181 Appleton St., Holyoke, Mass.—ZE

American Electroneering Co., 5025-19 W. Jefferson Blvd., Los Angeles 16, Calif.—ZB

Atlas Sound Corp., 1449 39th St., Brooklyn 18, N. Y.—ZC, ZD, ZH

Audio Equipment Co., 80-20 45th Ave., Elmhurst, L. I., N. Y.—ZD

Audio Pacific Co., 6110 Santa Monica Blvd., Hollywood 38, Calif.—ZD

BENDIX RADIO DIV., Bendix Aviation Corp., Baltimore 4, Md.—ZB

Best Mfg. Co., 1200 Grove St., Irvington 11, N. J.—ZD

Bogen Co., David, 663 Broadway, New York 12, N. Y.—ZG

Bozak Co., R. T., 90 Montrose Ave., Buffalo 14, N. Y.—ZC, ZD

Brociner Electronics Laboratory, 1546 Second Ave., New York 28, N. Y.—ZA, ZC, ZG

Brush Development Co., 3405 Perkins Ave., Cleveland 14, Ohio—ZB

Cannon Co., C. T., Springwater, N. Y.—ZB

Carbonneau Industries, 21 Ionia Ave., N.W., Grand Rapids 2, Mich.—ZD

Castlewood Mfg. Co., 12th & Burnett, Louisville 10, Ky.—ZG

Celotex Co., 120 S. LaSalle St., Chicago, Ill.—ZF

Cinaudagraph Speakers, Inc., 7334 N. Clark St., Chicago 26, Ill.—ZD, ZH

Cleveland Electronics, Inc., 6611 Euclid Ave., Cleveland, Ohio—ZC

Commercial Radio-Sound Corp., 231 E. 47th St., New York 17, N. Y.—ZG

Connecticut Telephone & Electric Corp., 70 Britannia St., Meriden, Conn.—ZB

Delco Radio Div., General Motors Corp., Kokomo, Ind.—ZD

DeVry Corp., 1111 Armitage Ave., Chicago 14, Ill.—ZD

DuKane Corp., St. Charles, Ill.—ZG

D-X Radio Products Co., 2300 W. Armitage Ave., Chicago, Ill.—ZD

Dyna-Labs, Inc., 132 Lafayette St., New York 13, N. Y.—ZB

Electronics of Staten Island, N. Y., 363 Victory Blvd., Staten Island 1, N. Y.—ZA, ZC, ZH

Electro-Voice, Inc., Carroll & Cecil Sts., Buchanay, Mich.—ZA, ZC, ZD, ZG, ZH

FEDERAL TELECOMMUNICATION LABORATORIES, INC., 500 Washington Ave., Nutley 10, N. J.—ZD

Glaser-Steers Corp., 2 Main St., Belleville 9, N. J.—ZD

Gulton Mfg. Corp., 212 Durham Ave., Metuchen, N. J.—ZB, ZH

Hallett Mfg. Co., 1601 W. Florence Ave., Inglewood, Calif.—ZE

Hamilton Electronics, 2726 Pratt Ave., Chicago 45, Ill.—ZD

Heppner Mfg. Co., P. O. Box 612, Round Lake, Ill.—ZD

Holl Audio Industries, P. O. Box 1230, Hollywood 28, Calif.—ZD

Insulite Co., 1100 Builders Exchange, Minneapolis, Minn.—ZF

Jensen Mfg. Co., 6601 S. Laramie Ave., Chicago, Ill.—ZD, ZH

Johns-Manville Corp., 22 E. 40th St., New York, N. Y.—ZF

Kimberley-Clark Corp., Insulation Div., Neenah, Wisc.—ZF

Klipsch & Associates, Hope, Ark.—ZC

Kupfrian Mfg. Co., Box 714, Binghamton, N. Y.—ZE

Lansing Sound, Inc., James B., 2439 Fletcher Drive, Los Angeles 39, Calif.—ZC, ZG, ZH

Libra Film Distributors, 6525 Sunset Blvd., Hollywood 28, Calif.—ZB

LINDBERG INSTRUMENT CO., 830 Folger Ave., Berkeley 2, Calif.—ZE

Link Radio Corp., 125 W. 17th St., New York 11, N. Y.—ZB

Lionel Corp., Irvington, N. J.—ZB

Lowell Mfg. Co., 1531 Branch St., St. Louis 7, Mo.—ZD, ZG

Metal Textile Corp., 647 E. 1st Ave., Middlesex, N. J.—ZE

Meyers, James G., 1056 Sheridan Ave., Bronx 56, N. Y.—ZF, ZG

Millen Mfg. Co., James, 150 Exchange St., Malden 48, Mass.—ZE

Murdock Co., Wm. J., 158 Carter St., Chelsea, Mass.—ZB

National Co., 61 Sherman St., Malden 48, Mass.—ZD

National Gypsum Co., 325 Delaware Ave., Buffalo, N. Y.—ZF

Olesen Co., Otto K., 1534 Cahuenga Blvd., Hollywood 28, Calif.—ZC, ZD, ZH

Oxford Electric Corp., 3911 S. Michigan Ave., Chicago 15, Ill.—ZD

PERFECTION ELECTRIC CO., 829 S. State St., Chicago 5, Ill.—ZD

PERMO-O-FLUX CORP., 4900 W. Grand Ave., Chicago 39, Ill.—ZB, ZC, ZD, ZH

Quam Nichols Co., 33rd Pl. & Cottage Grove Ave., Chicago 16, Ill.—ZC, ZD, ZH

Racon Electric Co., 52 E. 19th St., New York 3, N. Y. —ZD, ZH
RADIO CORP. OF AMERICA, RCA-Victor Div., Camden, N. J.—ZB, ZD, ZH
RADIO CORP. OF AMERICA, Tube Dep't., 415 S. 5th St., Harrison. N, J.—ZD
Radio-Music Corp., 84 South Water St., Port Chester, N. Y.—AC, AD
Raytheon Mfg. Co., Willow St., Waltham, Mass.—ZF
Roanwell Corp., 662 Pacific St., Brooklyn 17, N. Y.—ZB
Rola Co., 2330 Superior Ave., Cleveland 14, Ohio—ZD, ZH
Rowe Industries, 1702 Wayne St., Toledo 9, Ohio—ZA, ZD, ZG, ZH
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Stromberg-Carlson Co., 100 Carlson Rd., Rochester 3, N. Y. —ZD
Tarrytown Metalcraft Corp., 82 Chestnut St., Tarrytown, N. Y.—ZD
TELEX, Telex Park, St. Paul 1, Minn.—ZB
Trimm, Inc., 400 West Lake St., Libertyville, Ill.—ZB
UNIVERSITY LOUDSPEAKERS, INC., 80 S. Kensico Ave., White Plains, N. Y.—ZA, ZC, ZD, ZH
U. S. Gypsum Co., 300 W. Adams St., Chicago 6, Ill. —ZB
Utah Radio Prods. Co., 1123 E. Franklin St., Huntington, Ind.—ZC, ZD, ZH

27—Test Equipment

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Bridges, impedance ..... AAF
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Converter, R-F shift ..... ABZ
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Detector, vacuum leak ..... AAI
Generators, AM ..... AAJ
Generators, FM ..... AAK
Generators, TV ..... AAL
Generators, composite TV signal ..... AAM
Generators, grating ..... AAN
Generators, micro-wave signal ..... AAO
Generators, noise ..... AAP
Generators, pulse ..... ABS
Generators, signal ..... AAQ
Generators, square wave ..... AAR
Generators, sweep ..... AAS
Generators, timing marker ..... AAT
Indicators, resonance ..... AAU
Instruments, special laboratory ..... AAV
Q-Meters ..... AAW
Meters, crystal impedance ..... ABT
Meters, distortion and noise ..... AAX
Meters, frequency ..... AAY
Meters, grid dip ..... AAZ
Meters, output power ..... ABA
Meters, sound level ..... ABV
Meters, vibration ..... ABU
Meters, wow and flutter ..... ABB
Microvolter, audio frequency ..... ABC
Noise diode ..... ABX
Oscillators, audio ..... ABD
Oscillators, UHF ..... ABE
Oscilloscopes ..... ABF
Records, frequency test ..... ABG
Sets, field strength measuring ..... ABH
Sets, insulation test ..... ABI
Sets, sound level measuring ..... ABJ
Sets, transmission measuring ..... ABK
Standards, frequency ..... ABL
Stroboscope ..... ABM
Testers, tube ..... ABN
Voltmeters, vacuum tube ..... ABO
Volt-ohm-milliammeters ..... ABP
Units, decade inductor ..... ABQ

Advance Electronics Co., P.O. Box 2515, Paterson, N. J.—AAV
Aerocoil, Inc., 507 26th St., Union City, N. J.—AAC, AAU, AAV, AAY, AAZ, ABA, ABE
Aerolux Light Corp., 653 Eleventh Ave., New York 19, N. Y.—ABM
Airborne Instruments Laboratory, 160 Old Country Rd., Mineola, N. Y.—AAO, AAQ
Aircraft Electronics Associates, 94 Silas Dean Highway, Rocky Hill, Conn.—AAH, AAV
Aircraft Radio Corp., Boonton, N. J.—AAH, AAQ
Airlectron, Inc., Box 151, Caldwell, N. J.—ABF, ABO
Altec Lansing Corp., 9356 Santa Monica Blvd., Beverly Hills, Calif.—AAA
American Electroneering Co., 5025-19 W. Jefferson Blvd., Los Angeles 16, Calif.—AAB, AAQ, ABH, ABL, ABQ
American Television, Inc., 523 S. Plymouth Ct., Chicago 5, Ill.—AAL, AAM, AAR, AAS, ABF
American Time Products, Inc., 580 Fifth Ave., New York 19, N. Y.—ABL
Amplifier Corp. of America, 398 Broadway, New York 13, N. Y.—ABB
Antenna Research Laboratory, Inc., 797 Thomas Lane, Columbus 14, Ohio—AAA
Approved Electronic Instrument Corp., 142 Liberty St., New York 6, N. Y.—AAJ, AAK, AAL, AAM, AAQ, AAS, ABH,, ABO, ABP
ARF Prods., Inc., 7627 W. Lake St., River Forest, Ill.—AAK, AAS
Associate Research, Inc., 3758 W. Belmont Ave., Chicago 18, Ill.—AAV, ABI
Atlantic Electronics Corp., 89-91 Jefferson St., Passaic, N. J.—AAH
Audio Development Co., 2833 13th Ave., S. Minneapolis 7, Minn.—ABJ
Audio Instruments Co., 133 W. 14th St., New York 11, N. Y.—AAH, AAV, AAX
Audio-Tone Oscillator Co., 237 John St., Bridgeport 3, Conn.—ABD
Ballantine Laboratories, Inc., Boonton, N. J.—ABO
Barber Laboratories, Alfred W., 32-44 Francis Lewis Blvd., Flushing, N. Y.—AAJ,, AAV, ABO
Barker & Williamson, 237 Fairfield Ave., Upper Darby, Pa.—AAX, ABD
Barnes Development Co., 213 W. Baltimore Pike, Lansdowne, Pa.—AAE, AAG, AAV
Bassett, Inc., Rex, 311 N.W. 1st Ave., Fort Lauderdale, Fla.—AAV, ABD, ABL
Bendix Aviation Corp., Eclipse-Pioneer Div., Teterboro, N. J.—AAP
Berkeley Custom Electronics, 2571 Shattuck Ave., Berkeley 4, Calif.—AAA, AAH, AAX
Berkeley Scientific Corp., 2200 Wright Ave., Richmond, Calif.—AAR, AAV, AAY
Berkshire Laboratories,, 586 Lexington Rd., Concord, Mass.—AAD, AAH, AAR, AAS, AAT, AAV, ABD, ABM, ABS
Beta Electric Corp., 333 E. 103rd St., New York 29, N. Y. —ABF
Biddle Co., James G., 1316 Arch St., Philadelphia 7, Pa.— AAG, AAK, AAY
Bliley Electric Co., Union Station Bldg., Erie, Pa.—ABL
Boonton Radio Corp., Intervale Rd., Boonton, N. J.—AAJ, AAK, AAQ, AAV, AAW, ABD
Brociner Electronics Laboratory, 1546 Second Ave., New York 28, N. Y.—AAA, AAR, AAV
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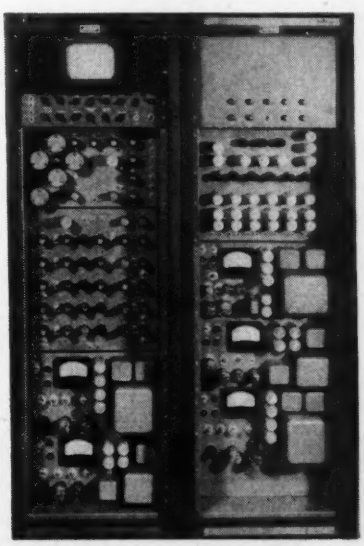

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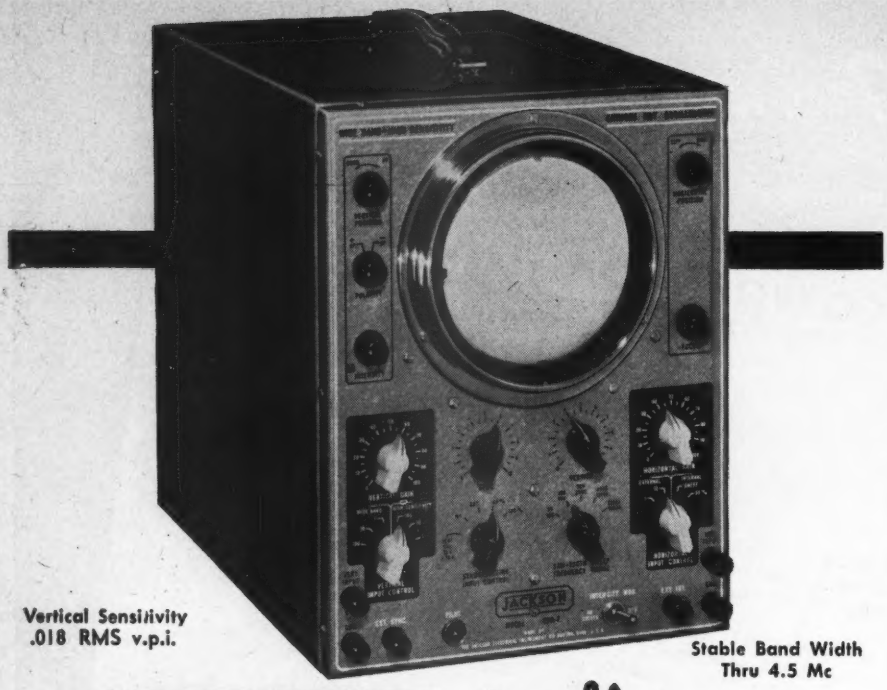

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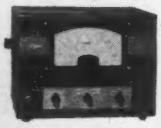

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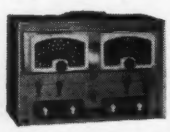

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Reeves-Hoffman Corp., 321 Cherry St., Carlisle, Pa.—ABL
Reiner Electronics Co., 152 W. 25th St., New York 1, N. Y.—AAB, AAQ, AAX, ABD, ABF, ABH, ABO
Roller Smith Corp., 1000 8th Ave., Bethlethem, Pa.— AAV, AAY, ABN, ABO, ABP
Rolin Co., 2066-2070 N. Fair Oaks Ave., Pasadena 3, Calif.—AAC, AAQ, ABA
Rubicon Co., Ridge Ave. & 35th St., Philadelphia 32, Pa. —AAG
Rutherford Electronics Co., 3724½ S. Robertson Blvd., Culver City, Calif.—AAA, AAH, AAT, AAV
Sarkes Tarzian, Inc., see **Tarzian, Inc.**, Sarkes
Schnitzer Instrument Co., 12031 Euclid Ave., Garden Grove, Calif.—ABI
Scott, Inc., Herman Hosmer, 385 Putnam Ave., Cambridge 39, Mass.—AAP, AAX, ABV
Shallcross Mfg. Co., Jackson & Pusey Aves., Collingdale, Pa.—AAB, AAD, AAE, AAG, AAH, AAV, ABI, ABJ, ABK
Spiatron Electronics & Television Corp., 30 E. 10th St., New York 3, N. Y.—AAH
Sierra Electronic Corp., 1050 Brittan Ave., San Carlos, Calif.—AAA, AAB, AAC, AAH, AAV, ABA, ABL, ABO
Silver Co., McMurdo, 417 Lafayette St., New York, N. Y. —AAE, AAQ, AAS, AAV
Simpson Electric Co., 5200 W. Kinzie St., Chicago 44, Ill. —AAJ, AAK, AAL, AAQ, AAS, AAT, AAY, ABA, ABF, ABH, ABI, ABJ, ABN, ABO, ABP
Small Motors, Inc., 2076 Elston Ave., Chicago 14, Ill. —ABD
Sound Apparatus Co., Stirling, N. J.—ABJ
Southwestern Industrial Electronics Co., 2831 Post Oak Rd., P. O. Box 13058, Houston 19, Texas—AAA, AAH, AAQ, AAV, ABC, ABD, ABO, ABP
Special Instruments Labs., 1003 Highland Ave., Knoxville, Tenn.—AAG, AAV
Spectrum Engineers, 540 N. 63rd St., Philadelphia 31, Pa.—AAH
Spencer-Kennedy Laboratories, Inc., 186 Massachusetts Ave., Cambridge 39, Mass.—AAA, AAC, AAH, AAV, ABF
Sperry Gyroscope Co., Div. Sperry Corp., Great Neck, N. Y. —AAC, AAF, AAO, AAQ, AAY, ABA, ABE, ABH, ABK, ABL
Sprague Electric Co., Beaver St., North Adams, Mass.— AAE
Square Root Mfg. Co., 391 Saw Mill River Rd., Yonkers, N. Y.—AAH
Standard Electronic Research Corp., 2 East End Ave., New York 21, N. Y.—AAA, AAH
Star Expansion Prods. Co., 147 Cedar St., New York 6, N. Y.—AAV
Stephens Mfg. Corp., 8538 Warner Drive, Culver City, Calif.—AAA
Sterling Instruments Co., 13331 Linwood Ave., Detroit 6, Mich.—AAH
Sticht Co., Herman H., 27 Park Place, New York, N. Y. —AAG, ABO
Stoddart Aircraft Radio Co., 6644 Santa Monica Blvd., Hollywood 38, Calif.—AAC, ABH
Superior Instrument Co., 227 Fulton St., New York, N. Y. —AAQ, AAV
Supreme, Inc., Greenwood, Miss.—AAJ, AAQ, ABN
Sylvan Electronic Laboratories, Inc., Broadalbin, N. Y.— AAZ
Sylvania Electric Prods. Co., 1740 Broadway, New York 19, N. Y.—AAJ, AAK, AAL, AAQ, AAS, ABF, ABN, ABO, ABP
Synthane Corp., 12 River Rd., Oaks, Pa.—CBJ
TARZIAN, INC., SARKES, 530 S. Walnut St., Bloomington, Ind.—AAO, AAQ, AAR
Tech Laboratories, Inc., Bergen & Edsall Blvds., Palisades Park, N. J.—AAB, AAC, AAD, AAE, AAF, AAG
Technology Instrument Corp., 531 Main St., Acton, Mass. —AAA, AAD, AAF, AAJ
Tektronix, Inc., 712 S. E. Hawthorne Blvd., Portland 14, Ore.—AAA, AAQ, AAR, ABF
TELECHROME, INC., 88 Merrick Rd., Amityville, L. I., N. Y.—AAH, AAK, AAL, AAM, AAN, AAO, AAP, AAQ, AAR, ABE, ABF, ABL
Telectro Industries Corp. 35-16 37th St., Long Island City 1, N. Y.—AAA
Telequip Radio Co., 2559 W. 21st St., Chicago 8, Ill.— AAM
Teletronics Laboratory, Inc., 352 Maple Ave., Westbury, L. I., N. Y.—AAA, AAH, ABD, ABF, ABS
Television Equipment Corp., 238 William St., New York 38, N. Y.—ABE, ABF
Television Projects, 3660 Coral Way, Miami 35, Fla.— AAQ, AAS
Tel-Instrument Co., 50 Paterson Ave., E. Rutherford, N. J. —AAA, AAL, AAM, AAS
Testing Instruments, Inc., 120 W. 2nd St., Dayton 2, Ohio —AAV
Trac-Tape Recording Apparatus Co., Box 221, Caldwell, N. J.—AAV
Transmitter Equip. Mfg. Co., 345 Hudson St., New York 14, N. Y.—AAH
Trans-Sonics, Inc., Bedford Airport, Bedford, Mass.—AAA
Transvision, Inc., New Rochelle, N. Y.—AAS, ABH
Triplett Electrical Instrument Co., Harmon Road, Bluffton, Ohio—AAS, ABF, ABN, ABP
Triumph Mfg. Co., 913 W. Van Buren St., Chicago 7, Ill. —AAA, AAQ, AAR, ABD, ABF, ABP
Univox Corp., 83 Murray St., New York 7, N. Y.—AAA
Vacuum-Electronic Engineering Co., 756 3rd Ave., Brooklyn 32, N. Y.—AAI
VFB Line Corp., Box 6789 Towson 4, Md.—AAF
Vickers, Inc., 1815 Locust St., St. Louis 3, Mo.—AAA
Walkirt Co., 5308 Marilyn Ave., Culver City, Calif.—AAA, AAH, AAR, AAV, AAY
WATERMAN PRODS. CO., 2445-63 Emerald St., Philadelphia 25, Pa.—ABF
Waveforms, Inc., 333 Sixth ve., New York 14, N. Y.— AAA, AAB, AAH, AAJ, AAK, AAQ, AAV, ABD
Weinschel Engineering Co., 919 Jesup-Blair Drive, Silver Spring, Md.—AAC, ABD
Welch Mfg. Co., W. M., 1515 Sedgwick St., Chicago 10, Ill.—AAD, AAE, AAG, AAI, AAV, ABF, ABP
Western Electro-Acoustic Lab., 204 S. Beverly Dr., Beverly Hills, Calif.—
Western Sound & Electric Lags, 805 S. Fifth St., Milwaukee 4, Wisc.—AAA, AAE, AAG, AAH
Weston Electrical Instrument Corp., 614 Frelinghuysen Ave., Newark 5, N. J.—AAY, ABA, ABH, ABI, ABN, ABO, ABP
Weston Laboratories, 410 Glen Rd., Weston 93, Mass.— ABD, ABO
White Marine Radio Co., 122 Chambers St., New York 7, N. Y.—AAH
Winslow Co., 9 Liberty St., Newark 5, N. J.—AAF, AAG, ABI

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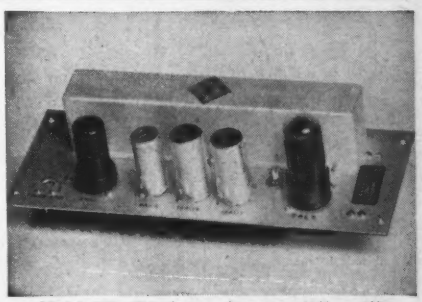
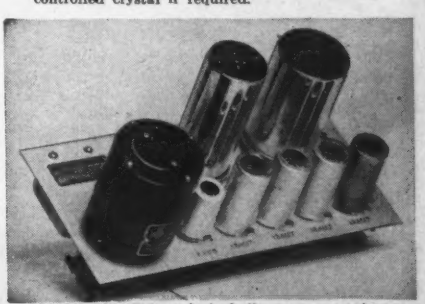
and many other applications based on precision timing, sidereal and mean time.

FOR A MORE COMPLETE LISTING OF MODELS SEE OUR AD IN THE 1950 ELECTRONIC BUYERS GUIDE. LOOK FOR THE DESCRIPTION OF MODEL 105 AND OTHERS.



Model 127. This is a unit on an 11⅛ x 4½ inch mounting plate COMPLETE WITH POWER SUPPLY. It can be had with an output frequency as low as 60 cps. Temperature controlled crystal if required.



Model 125. This unit is built on a mounting plate 9 x 4½ inches. It has sinewave outputs at BOTH 400 CPS AND 60 CPS.

We now have 25 standard models and we are expanding our line at the present time.

Catalog or further information gladly furnished on request.

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POWER FACTOR CORRECTION
MOTOR CAPACITORS
SIGNAL INSTRUMENTS

CHICAGO CONDENSER'S rectangular type capacitors are hermetically sealed and tested at twice-rated voltage.

BATHTUB TYPE

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MOTORS • ELECTRONICS
SPECIAL TIMMING

CHICAGO CONDENSER'S bathtub type capacitors are hermetically sealed and tested at three-times voltage.

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28—*Indicating Devices*

Antenna ammeters ..... **BAA**
Galvanometers ..... **BAJ**
Meters
Ampere ..... **BAB**
Frequency ..... **BAC**
RF power ..... **BAD**
Volt ..... **BAE**
Meter repair service ..... **Bar**
Miscellaneous ..... **BAG**
Thermocouple instruments ..... **BAH**
Volume indicators ..... **BAI**

Aero Instrument Co., 11423 Vanown St., N. Hollywood, Calif.—BAC
Aerolux Light Corp., 653 Eleventh Ave., New York 19, N. Y.—BAE
Airborne Instruments Laboratory, 160 Old County Rd., Mineola, N. Y.—BAG
American Electroneering Co., 5025-19 W. Jefferson Blvd., Los Angeles 16, Calif.—BAC
American Hydromath Corp., 145 W. 57th St., New York 19, N. Y.—BAG
Amplifier Corp. of America, 398 Broadway, New York 13, N. Y.—BAI
Andrew Corp., 363 E. 75th St., Chicago 19, Ill.—BAA
Ballantine Laboratories, Inc., Boonton, N. J.—BAE
Barker & Williamson Co., 237 Fairfield Ave., Upper Derby, Pa.—BAC
Barnes Development Co., 213 W. Baltimore Pike, Lansdowne, Pa.—BAH
Berkeley Scientific Corp., 2200 Wright Ave., Richmond, Calif.—BAC
Biddle Co., James G., 1316 Arch St., Philadelphia 7, Pa.—BAC
Bird Electronic Corp., 1800 E. 38th St., Cleveland 14, Ohio—BAD, BAH
Brown Instrument Div., Minneapolis-Honeywell Regulator Co., Wayne & Roberts Aves., Philadelphia 44, Pa.—BAG
Burlington Instrument Co., 203 N. 3rd St., Burlington, Iowa—BAB, BAE, BAH, BAI
Caltron Prods. Co., 1406 S. Hobart Blvd., Los Angeles 6, Calif.—BAC
Chicago Industrial Instrument Co., 536 W. Elm St., Chicago 10, Ill.—BAB, BAE
Cinema Engineering Co., 1510 W. Verdugo Ave., Burbank, Calif.—BAI
Clarkstan Corp., 11921 W. Pico Blvd., Los Angeles 64, Calif.—BAH
Cole Instrument Co., 1320 S. Grand Ave., Los Angeles 15, Calif.—BAA, BAF, BAI
Communications Co., 300 Greco Ave., Coral Gables, Fla.—BAD
Conn, Ltd., C. G., Elkhart, Ind.—BAC
Distillation Prods. Industries, Div. Eastman Kodak Co., 755 Ridge Rd. West, Rochester 13, N. Y.—BAH
Electric Design & Mfg. Co., Burlington, Iowa—BAB, BAE
Electrix Corp., 150 Middle St., Pawtucket, R. I.—BAC
Electronic Signal Co., 541 Willis Ave., Williston Park, N. Y.—BAH
Electro-Tech Equip. Co., 309 Canal St., New York 13, N. Y.—BAA, BAB, BAC, BAD, BAE, BAF, BAG, BAH, BAI
Feiler Engineering Co., 8026 Monticello Ave., Skokie, Ill.—BAG
Field Electrical Instrument Co., 8 No. Manheim Blvd., New Paltz, N. Y.—BAH
Fluke Engineering Co., John, 116 Woodbury Ave., Springdale, Conn.—BAD
Gates Radio Co., Quincy, Ill.—BAA, BAC, BAG, BAI
GENERAL ELECTRIC CO., APPARATUS DEP'T., Schenectady 5, N. Y.—BAA, BAC, BAD, BAG, BAH, BAI
General Radio Co., 275 Massachusetts Ave., Cambridge 39, Mass.—BAC, BAE
Gertsch Prods., Inc., 11846 Mississippi Ave., Los Angeles 25, Calif.—BAC
Hastings Instrument Co., Super Highway & Pine Ave., Hampton, Va.—BAH
HICKOK ELECTRICAL INSTRUMENT CO., 10514 Dupont Ave., Cleveland 8, Ohio—BAB, BAC, BAE, BAF, BAG, BAH, BAI
Illinois Testing Labs., Inc., 420 N. LaSalle St., Chicago 10, Ill.—BAF, BAH
Industrial Control Co., Straight Path & Arlington Ave., Wyandanch, L. I., N. Y.—BAE
Industrial Devices, Inc., 22 State Rd., Edgewater, N. J.—BAG
International Instruments, Inc., 331 East St., New Haven 11, Conn.—BAA, BAC, BAG, BAI
Ionic Equipment Co., 1705 N. Kenmore, Los Angeles 27, Calif.—BAG
Javex, Garland, Texas—BAG
J-B-T Instruments, Inc., 441 Chapel St., New Haven 8, Conn.—BAA, BAB, BAC, BAE
Jones Electronics Co., M. C., 96 N. Main St., Bristol, Conn.—BAD
Lawton Prods. Co., 624 Madison Ave., New York, N. Y.—BAG
Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia 44, Pa.—BAH
Link Radio Corp., 125 W. 17th St., New York 11, N. Y.—BAC
Liston-Folb Instrument Co., 20 Beckley Ave., Stamford, Conn.—BAH
Marconi Instruments, Ltd., 23 Beaver St., New York, N. Y.—BAD
Marion Electrical Instrument Co., 400 Canal St., Manchester, N. H.—BAB, BAE, BAI
Meters, Inc., 915 Westfield Blvd., Indianapolis 20, Ind.—BAG, BAI
Microwave Equipment Co., Greenbrook Rd., N. Caldwell, N. J.—BAC
Minnesota Electronics Corp., 47 W. Water St., St. Paul 1, Minn.—BAC
Neptune Electronics Co., 433 Broadway, New York 13, N. Y.—BAG
Nilsson Electrical Laboratory, Inc., 103 Lafayette St., New York 13, N. Y.—BAF
Potter Instrument Co., 115 Cutter Mill Rd., Great Neck, N. Y.—BAC
Precise Development Corp., 999 Long Beach Rd., Oceanside, L. I., N. Y.—BAD, BAE
Pyramid Instrument Corp., 49 Howard St., New York 13, N. Y.—BAG
Pyrometer Instrument Co, Bergenfield, N. J.—BAH
Radioactive Prods., Inc., 443 W. Congress St., Detroit 26, Mich.
RADIO CORP. OF AMERICA, RCA-VICTOR DIV., Camden, N. J.—BAA, BAC, BAG, BAI
Radio Frequency Laboratories, Boonton, N. J.—BAG, BAD
Rawson Electrical Instrument Co., 117 Potter St., Cambridge 42, Mass.—BAE, BAH
Reeder & Co., Charles M., 171 Victor Ave., Detroit 3, Mich.—BAH
Reeves-Hoffman Corp., 321 Cherry St., Carlisle, Pa.—BAC
Reiner Electronics Co., 152 W. 25th St., New York 1, N. Y.—BAA, BAC, BAG, BAI
Roller-Smith Co., 1000 8th Ave., Bethlehem, Pa.—BAB, BAC, BAE, BAF
Rollin Co., 2066-70 N. Fair Oaks Ave., Pasadena 3, Calif.—BAD
Shallcross Manufacturing Co., Jackson & Pusey Aves., Collingdale, Pa.—BAJ
Sierra Electronic Corp., 1050 Brittan Ave., San Carlos, Calif.—BAD, BAG
Silver Co., McMurdo, 417 Lafayette St., New York, N. Y.—BAC
Simpson Electric Co., 5208 W. Kinzie St., Chicago 44, Ill.—BAB, BAC, BAD, BAE, BAF, BAG, BAH, BAI
Sperry Gyroscope Co., Div. Sperry Corp., Great Neck, N. Y.—BAC, BAD
Star Measurements Co., 442 E. 166th St., New York 56, N. Y.—BAG
Sterling Instruments Co., 13331 Linwood Ave., Detroit 6, Mich.—BAF
Triplett Electrical Instrument Co., Harmon Rd., Bluffton, Ohio—BAB, BAC, BAE, BAI
Walkirt Co., 5808 Marilyn Ave., Culver City, Calif.—BAC
Welch Mfg. Co., W. M., 1515 Sedgwick St., Chicago 10, Ill.—BAB, BAC, BAE, BAH
WESTINGHOUSE ELECTRIC CORP., Construction & Communication Sec. 10-L, E. Pittsburgh, Pa.—BAA, BAC, BAG, BAI
Weston Electrical Instrument Corp., 614 Frelinghuysen Ave., Newark 5, N. J.—BAB, BAC, BAD, BAE, BAH, BAI
Weymouth Instrument Co., 1440 Commercial St., E. Weymouth 89, Mass.—BAC
Winslow Co., 9 Liberty St., Newark 5, N. J.—BAF, BAG

29—*Major Replacement Parts*

Analyzer, spectrum ..... **CBI**
Cable ..... **CAA**
Capacitors
Air ..... **CBB**
Ceramic ..... **CAW**
Electrolytic ..... **CAB**
Mica ..... **CAC**
Oil ..... **CAD**
Paper ..... **CAE**
Pressurized ..... **CBC**
Tantalum ..... **CBA**
Vacuum ..... **CAF**
Variable ..... **CBD**
Circuit breaker, magnetic ..... **CAG**
Coil assemblies ..... **CBK**
Coil forms ..... **CBJ**
Deflection yokes ..... **CBP**
Filters, RF interference ..... **CAH**
Inductances
Filter ..... **CAI**
Glass ..... **CBR**
Tuning ..... **CAJ**
Rectifiers, metal ..... **CAL**
Relays
Antenna ..... **CAM**
Audio control ..... **CAN**
Low power ..... **CBO**
Power ..... **CAO**
Time delay ..... **CBG**
Resistors
Composition ..... **CBF**
Power type ..... **CAP**
Variable ..... **CAQ**
Switches
Lever ..... **CAY**
Mercury ..... **CAR**
Power ..... **CAS**
Remote control ..... **CBE**
Rotary ..... **CAX**
Slide ..... **CAZ**
Time delay ..... **CAT**
Transformers
Audio ..... **CAU**
Flyback ..... **CBL**
Power ..... **CAV**
Pulse ..... **CBM**
Variable ..... **CBH**

Accurate Engineering Co., 2005 Blue Island Ave., Chicago 8, Ill.—CAL, CAV
Acme Electric Corp., 31 Water St., Cuba, N. Y.—CAB, CAU, CAV
Acro Products Co., 215 Arch St., Philadelphia 6, Pa.—CAU, CAV
Acro Transformer & Mfg. Co., 26-02 Fourth St., Astoria 2, N. Y.—CAL, CAU
Advance Transformer Co., 1122 W. Catalpa Ave., Chicago 40, Ill.—CAV

Adams & Westlake Co., 1000 N. Michigan St., Elkhart, Ind.—CAO
Advance Electric & Relay Co., 2435 N. Naomi St., Burbank, Calif.—CAM, CAN, CAO
Aerocoil Inc., 507 26th St., Union City, N. J.—CAH, CAI, CAJ, CAL
Aerolux Light Corp., 653 Eleventh Ave., New York 19, N. Y.—CAR
AEROVOX CORP., 740 Belleville Ave., New Bedford, Mass.—CAB, CAC, CAD, CAE, CAH
Allen-Bradley Co., 138 W. Greenfield Ave., Milwaukee 4, Wisc.—CAN, CAO, CAQ, CBF
Allied Control Co., 2 East End Ave., New York 21, N. Y. —CAM, CAN, CAO
Alpha Wire Corp., 430 Broadway, New York 13, N. Y. —CAA
ALTEC LANSING CORP., 9356 Santa Monica Blvd., Beverly Hills, Calif.—CAU, CAV
American Condenser Co., 4410 N. Ravenswood Ave., Chicago 40, Ill.—CAB, CAE
American Gas Accumulator Co., 1029 Newark Ave., Elizabeth 3, N. J.—CAO, CBG
AMERICAN PHENOLIC CORP., 1830 S. 54th Ave., Chicago 50, Ill.—CAA
American Radionic Co., 33 Flatbuish Ave., Brooklyn 17, N. Y.—CAD, CAE, CAH
American Relay & Controls, Inc., 4901 W. Flournoy St., Chicago 44, Ill.—CAO
American Television & Radio Co., 300 E. 4th St., St. Paul 1, Minn.—CAL
American Transformer Co., 178 Emmet St., Newark 5, N. J.—CAV
AMPERITE CO., INC., 561 Broadway, New York 12, N. Y.—CBG
ANDREW CORP., 363 E. 75th St., Chicago 19, Ill.—CAA
Applied Science Corp. of Princeton, P. O. Box 44, Princeton, N. J.—CAS
ARF Products, Inc., 7627 W. Lake St., River Forest, Ill. —CBE
Assembly Products, Inc., Chagrin Falls, Ohio.—CAO
Astron Corp., 255 Grant Ave., E. Newark, N. J.—CAB, CAD, CAE, CAH
Atlas Resistor Co., 423 Broome St., New York 13, N. Y. CAP, CAQ
Audio Development Co., 2833 13th Ave., Minneapolis 7, Minn.—CAI, CAU, CAV
Autocall Co., Shelby, Ohio—CAN
Automatic Electric Mfg. Co., 10 State St., Mankato, Minn.—CAM, CAO, CAT
Automatic Electric Sales, 1033 W. Van Buren St., Chicago 7, Ill.—CAM, CAN, CAO
BENDIX AVIATION CORP., ECLIPSE PIONEER DIV., Teterboro, N. J.—CAV
Best Mfg. Co., 1200 Grove St., Irvington 11, N. J.—CAV
Bogen Co., David, 663 Broadway, New York 12, N. Y.— CAU, CAV
Booth Co., Arthur E., 4124 Beverly Blvd., Los Angeles 4, Calif.—CAO
Broadway Coil Co., 5638 N. Broadway, Chicago 40, Ill. —CAJ
Bud Radio, Inc., 2118 E. 55th St., Cleveland 3, Ohio— CBD
Bunnell & Co., J. H., 81 Prospect St., Brooklyn 1, N. Y. —CAJ, CAN
BURNELL & CO., 45 Warburton Ave., Yonkers, N. Y.— —CAH, CAJ
Carborundum Co., Niagara Falls, N. Y.—CAW
Carter Parts Co., 213 Institute Pl., Chicago 10, Ill.— CAQ, CAR, CAS
CENTRALAB DIV., GLOBE-UNION, INC., 900 E. Keefe Ave., Milwaukee 1, Wisc.—CAP, CAQ, CAW, CAX, CAY, CAZ
Central Transformer Co., 910 W. Jackson, Chicago 7, Ill. —CAI, CAJ, CAU, CAV
Centronics Co., 5065 Broadway, New York 34, N. Y.— CAI, CAJ
Ceramic Heater Cathode Resistor Co., 20 First St., Keyport, N. J.—CAP
Chase Brass & Copper Co., 236 Grand St., Waterbury 20, Conn.—CAA
CHICAGO CONDENSER CORP., 3255 W. Armitage Ave., Chicago 47, Ill.—CAD, CAF
Chicago Telephone Supply Corp., 1142 W. Beardsley Ave., Elkhart, Ind.—CAP, CAQ
Chicago Transformer, 3501 Addison St., Chicago 18, Ill. CAU, CAV
Church Co., George H., 5109 Halifax Ave., Minneapolis 10, Minn.—CAD, CAE, CAH
Cinema Engineering Co., 1510 W. Verdugo Ave., Burbank, Calif.—CAU, CAQ
Clare & Co., C. P., 4719 W. Sunnyside Ave., Chicago 30, Ill—CAM, CAN, CAO
Clark Electronic Laboratories, Box 165, Palm Springs, Calif.—CAL
CLARKSTAN CORP., 11921 W. Pico Blvd., Los Angeles 64, Calif.—CAU
Clarostat Mfg. Co., Washington St., Dover, N. H.—CAP, CAQ
CLEVELAND CONTAINER CO., 6201 Barberton Ave., Cleveland 2, Ohio—CAM, CAN, CBI
Coil Winders, Inc., 61 Bergen St., Brooklyn 2, N. Y.— CAH, CAI, CAJ, CAP
Columbus Process Co., State & Maple Sts., Columbus, Ind.—CAV
Communication Accessories, Hickman Mills, Mo.—CAH, CAI, CAJ
Communication Products Co., Marlboro, N. J.—CAX
Conant Laboratories, 6500 "O" St., Lincoln 5, Nebr. —CAL
Condenser Products, 7517 N. Clark St., Chicago 26, Ill. —CAB, CAD, CAW
Continental Carbon, Inc., 13900 Lorain Ave., Cleveland, Ohio—CBF
Cook Electric Co., 2700 Southport Ave., Chicago 14, Ill. —CAN, CAO
Corneli-Dubilier Electric Corp., 333 Hamilton Blvd., S. Plainfield, N. J.—CAB, CAC, CAD, CAE, CBA
CORNING GLASS WORKS, Corning, N. Y.—CBR
Cornish Wire Co., 50 Church St., New York 7, N. Y. —CAA
Cosmic Radio Corp., 853 Whittier St., New York 59, N. Y.—CAB, CAE
Cramer Co., R. W., Centerbrook, Conn.—CAT
Crescent Co., Box 260, Pawtucket, R. I.—CAA
Crest Transformer Corp., 1834 W. North Ave., Chicago 22, Ill.—CAI, CAU, CAV
Cutler Hammer, Inc., 411 N. 12th St., Milwaukee 1, Wisc.—CAO
Daven Co., 191 Central Ave., Newark, N. J.—CAQ
Delco Radio, P. O. Box 737, Kokomo, Ind.—CAU, CAV
Dietz Co., Henry G., 12-16 Astoria Blvd., Long Island City 2, N. Y.—CAX
Dietz Design & Mfg. Co., Grandview, Mo.—CAI, CAJ, CAU, CAV
Dinion Coil Co., Drawer D, Caledonia, N. Y.—CAU, CAV
Drake Co., R. L., 11 Longworth St., Dayton 2, Ohio— CAH, CAI, CAU, CAV
Driver-Harris Co., Harrison, N. J.—CAP
Dumont Electric Co., 308 Dyckman St., New York 34, N. Y.—CAB, CAE
Durakool, Inc., 1010 N. Main St., Elkhart, Ind.—CAO
Dynamic Resistor Corp., 6 Cutter Mill Rd., Great Neck, N. Y.—CAO
Ebert Electronics Co., 185-09 Jamaica Ave., Hollis 7, L. I., N. Y.—CAO
Edison Inc., Thomas A., Instrument Div., W. Orange, N. J.—CBG
ELECTRIC REACTANCE CORP., Seneca Ave., Olean, N. Y.—CAI, CAP, CAW, CRD
Electrical Windings, Inc., 2015 N. Kolmar Ave., Chicago 39, Ill.—CAI, CAU, CAV
Electricoil Transformer Co., Westerly Rd., Ossining, N. Y. —CAL, CAV
Electro-Motive Mfg. Co., St. Park & John Sts., Willimantic, Conn.—CAE, CAW, CBC, CBD
Electronic Apparatus Corp., 116 E. Jackson Blvd., Elkhart, Ind.—CAO, CAR
Electronic Designs, Inc., 28 School St., Yonkers, N. Y. —CAJ, CAL, CAH
Electronic Indicator Corp., 67 N. 11th St., Brooklyn, N. Y.—CAP
Electronic Rectifiers, Inc., 2102 Spann Ave., Indianapolis 3, Ind.—CAL
Electronic Transformer Co., 207 W. 25th St., New York 1, N. Y.—CAH, CAI, CAJ, CAU, CAV

HUDSON RADIO & TELEVISION CORP.

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Authorized Distributor of All Standard Electronic Equipment

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world's toughest xformers

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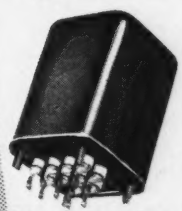
"SEALED-IN-STEEL"

New Equipment Transformers

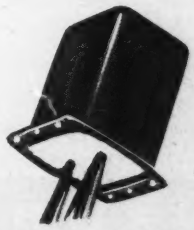
Available in Three Versatile Constructions



H-Type. Steel base cover deep-seal soldered into case. Terminals hermetically sealed. Ceramic bushings. Stud-mounted unit.

MEETS MIL-T-27 SPECS

S-Type. Steel base cover fitted with phenolic terminal board. Convenient numbered solder lug terminals. Flange-mounted unit.



C-Type. With 10" color-coded stripped and tinned leads brought out through fibre board base cover. Flange-mounted unit.

1. Exclusive one-piece drawn-steel case, unsurpassed for strength, moisture-resistance, better electrostatic and magnetic shielding, mounting ease, and streamlined appearance.
2. Uniformly-wound precise coil structures—cooler operation and better electrostatic shielding in power units—minimum leakage, optimum coupling in audio units.
3. Core of high-grade non-aging silicon steel brought to high efficiency by scientific heat-treating in CHICAGO'S own annealing ovens.
4. Core and coil vacuum-impregnated with varnish. Final high-temperature baking achieves a perfectly impregnated coil and core locked against vibration.
5. All internal free space is filled by special, moisture-resistant compound. Prevents corrosion and helps maintain far cooler operation than in conventional air-surrounded mountings.
6. Checked by quality controls at every stage of manufacture, rigidly inspected, "torture-chamber" tested to insure long, dependable life in actual service.

CHICAGO Hermetically-Sealed Transformers meet full military requirements of MIL-T-27

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- **FAST SERVICE** — Mail Orders Shipped Within 24 Hours, to Any Part of the World!
- **COMPLETE STOCK**—All Standard Makes of Electronic Equipment... Tubes, Components, Replacement Parts, Test Equipment, etc.
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- **EXPERT PERSONNEL** — Our Trained Men can help with your Electronic Problems.
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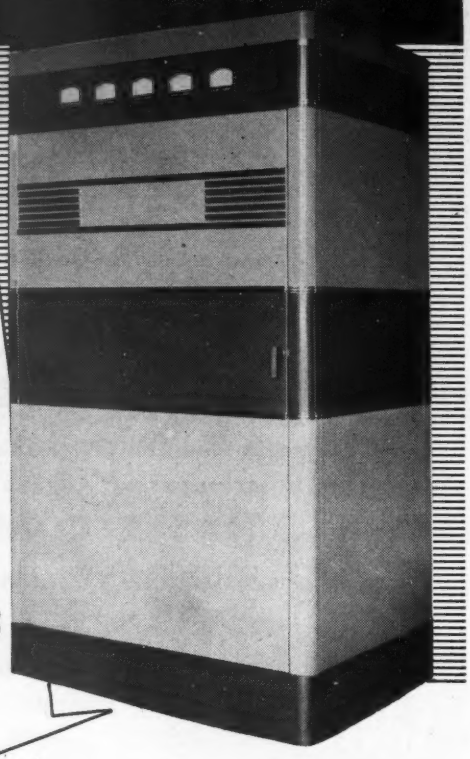
JOHNSON antenna phasing equipment



Individually Designed

TO YOUR CONSULTANT'S SPECIFICATIONS

A tremendous advantage offered by JOHNSON Antenna Phasing Equipment is that your installation is individually designed!

This means there is no need for compromises with good engineering — you get ***exactly what your consultant specifies,*** right down to the last detail.

JOHNSON is able to offer this because JOHNSON makes no "standard units" necessitating design changes on your part to conform.

JOHNSON manufactures nearly every component in an adequate variety of ratings and types and our engineers have available just the right material for any application.

The cost is no more — in fact, it is frequently lower than less flexible, less generously rated equipment. JOHNSON equipment offers you optimum circuit design, automatic switching from directional to non-directional operation, and a host of other advantages.

OTHER JOHNSON BROADCAST EQUIPMENT

- Adjustable phase sampling loops
- Isolation filters
- Sampling lines
- TV-FM-AM coaxial line
- Fixed capacitors
- Variable capacitors
- Standing wave indicators
- R.F. contactors
- Tower lighting filters
- Transmission line supports
- Pressurized capacitors
- Neutralizing capacitors
- Fixed inductors
- Variable inductors
- Feed-thru bowl assemblies
- Make Before Break switches

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a famous name in Radio

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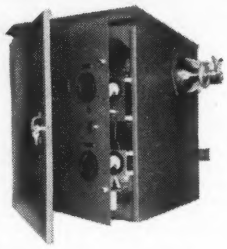
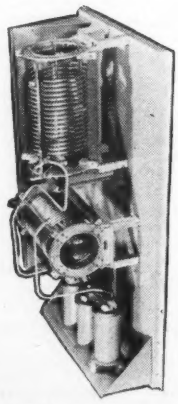
Here's a typical JOHNSON phasing unit. JOHNSON can match in design and finish any make or model of transmitter cabinet.



Featuring an interior door that remains closed during tuning adjustments, this antenna coupling unit is completely weatherproof.



Where a tuning house is used, this efficient panel mounted coupling network saves money. It is part of a 50KW installation at WJAS.

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Ferranti Electric, Inc., 30 Rockefeller Plaza, New York 20, N. Y.—CAU, CAV
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Forest Electric Co., 7216 Circle Ave., Forest Park, Ill.—CAJ, CAU
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Freed Transformer Co., 1718 Weirfield St., Brooklyn 27, N. Y.—CAI, CAU, CAV
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Gee-Lar Mfg. Co., 1330 Tenth Ave., Rockford, Ill.—CAS
General Communication Co., 530 Commonwealth Ave., Boston 15, Mass.—CAM
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General Insulated Wire Works, Inc., 69 Gordon Ave., Providence 5, R. I.—CAA
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Goslin Electric & Mfg. Co., 2921 W. Olive Ave., Burbank, Calif.—CAU, CAV
Gramer Transformer Co., 2734 N. Pulaski Rd., Chicago 39, Ill.—CAU, CAV
Green Electric Co., W., 130 Cedar St., New York 6, N. Y.—CAL
Guardian Electric Mfg. Co., 1627 Walnut St., Chicago 7, Ill.—CAG, CAM, CAN, CAO
Gudeman Co., 361 W. Superior St., Chicago 10, Ill.—CAB, CAD, CAE
Gulton Mfg. Corp., 212 Durham Ave., Metuchen, N. J.—CAU
Halldorson Co., 4500 Ravenswood Ave., Chicago 40, Ill.—CAU, CAV
Hardwick, Hindle, Inc., 40 Hermon St., Newark 5, N. J.—CAP
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Heinemann Electric Co., Penna. Ave. & Plum St., Trenton 2, N. J.—CAG
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Highland Engineering Co., Main & Urban Sts., Westbury, N. Y.—CAI, CAU, CAV
Hoffman Radio Corp., 6200 S. Avalon Blvd., Los Angeles 6, Calif.—CAI, CAJ
HUDSON RADIO & TELEVISION CORP., 48 W. 48th St., New York 19, N. Y.—CAM, CAV, CBL, CBM
HYCOR CO., 11423 Vanowen St., N. Hollywood, Calif.—CAP
Illinois Condenser Co., 1616 N. Throop St., Chicago 22, Ill.—CAB
Industrial Condenser Corp., 3243 N. California Ave., Chicago 18, Ill.—CAB, CAE, CAD, CAH
Instrument Resistors Co., 1036 Commerce Ave., Union, N. J.—CAP, CBF
International Rectifier Corp., 6809 S. Victoria Ave., Los Angeles 43, Calif.—CAL
INTERNATIONAL RESISTANCE CO., 401 N. Brand St., Philadelphia 8. Pa.—CAP, CAQ, CBE
I-T-E Vircuit Breaker Co., 19th & Hamilton Sts., Philadelphia 30, Pa.—CAG, CAP
Jefferies Transformer Co., 1710 E. 57th St., Los Angeles, Calif.—CAV
Jefferson Electric Co., 900 25th Ave., Bellwood, Ill.—CAU
Jennings Radio & Mfg. Co., 1098 E. William St., San Jose 12, Calif.—CBD
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Kenyon Transformer Co., 840 Barry St., New York 59, N. Y.—CAU, CAV
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Kings Microwave Co., 50 Marbledale Rd., Tuckahoe, N. Y.—CAM
Kotron Rectifier Corp., 54 Clark St., Newark 4, N. J.—CAL

Kulka Electric Mfg. Co., 633 S. Fulton Ave., Mt. Vernon, N. Y.—CAS
Kurman Electric Co., 35-18 37th St., Long Island City 1, N. Y.—CAM, CAN
K-V Transformer Corp., 4412 Park Ave., New York 57, N. Y.—CAU, CAV
Kyle Corp., S. Milwaukee, Wisc.—CAV
Laboratory for Electronics, 43 Leon St., Boston, Mass.—CAU, CAV
Langevin Mfg. Corp., 37 W. 65th St., New York 23, N. Y.—CAU, CAV
Lavoie Laboratories, Inc., Matawan-Freehold Rd., Morganville, N. J.—CAU, CAV
Leach Relay Co., 5915 Avalon Blvd., Los Angeles 3, Calif.—CAM, CAN, CAO
Lectrohm, Inc., 5939 Archer Ave., Chicago 38, Ill.—CAP
Lee Electric & Mfg. Co., 2806 Clearwater St., Los Angeles 26, Calif.—CAI, CAL
Leland, Inc., G. H., 1501 Webster St., Dayton 2, Ohio—CAM, CAN, CAO
Lenkert Electric Co., 1105 Old County Rd., San Carlos, Calif.—CAI
Lenz Electric Mfg. Co., 1751 N. Western Ave., Chicago 47, Ill.—CAA
Link Radio Corp., 125 W. 17th St., New York 11, N. Y.—CAJ, CAL, CAM, CAN, CAO
Lionel Corp., Irvington, N. J.—CAG, CAL, CAM, CAN, CAO, CAS, CAT, CAU, CAV
Littelfuse, Inc., 4757 Ravenswood Ave., Chicago 40, Ill.—CAB
Lumenite Electronic Co., 407 S. Dearborn St., Chicago 5, Ill.—CAT
Mallory & Co., P. R., 3029 E. Washington St., Indianapolis 6, Ind.—CAB, CAC, CAE, CAF, CAJ, CAL, CAP, CAQ, CAX, CAW, CBD, CBF
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Melco Products Inc., 22 E. Hennepin Ave., Minneapolis, 1, Minn.—CAV
Merit Transformer Corp., 4427 N. Clark St., Chicago 40, Ill.—CAU, CAV
Micamold Products Corp., 1087 Flushing Ave., Brooklyn, N. Y.—CAB, CAE, CAP, CBD
Midwest Automatic Control Co., 510 Third St., Des Moines 9, Iowa—CAA
Mid-West Coil & Transformer Co., 1642 N. Halsted St., Chicago 17, Ill.—CAI, CAU, CAV
Millen Mfg. Co., James, 150 Exchange St., Malden 48, Mass.—CAJ
Miller Co., B. F., P. O. Box 568, Trenton, N. J.—CAI
Model Eng'g. & Mfg. Co., 2800 Milwaukee Ave., Chicago 18, Ill.—CAP, CAQ
Model Rectifier Corp., 1510 Nostrand Ave., Brooklyn 26, N. Y.—CAL
Mogull Co., Alexander, 161 Washington St., New York 6, N. Y.—CAB, CAC, CAD, CAE, CAG, CAH, CAP, CAS
Monarch Mfg. Co., 2014 N. Major Ave., Chicago 39, Ill.—CAI
Motoresearch Co., 1600 Junction Ave, Racine, Wisc.—CBF
Mucon Corp., 9 St. Francis St., Newark 5, N. J.—CAW
Muter Co., 1255 S. Michigan Ave., Chicago 5, Ill.—CAP, CBD
Nazareth Transformer Corp., 12 North St., Danbury, Conn.—CAV
Network Mfg. Corp., 213 W. 5th St., Bayonne, N. J.—CAH
New York Transformer Co., Third Ave., Alpha, N. J.—CAU, CAV
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Nothelfer Winding Lab., 118 Albemarle Ave., Trenton, N. J.—CAV
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Ohmite Mfg. Co., 4835 W. Flournoy St., Chicago 44, Ill.—CAP, CAQ, CAS
Orthon Corp., 196 Albion Ave., Paterson 2, N. J.—CAH, CAI, CAU, CAV
Osborne Transformer Corp., 948 E. Lafayette Ave., Detroit 7, Mich.—CAU
PARAMOUNT PAPER TUBE CORP., 614 Lafayette St., Ft. Wayne, Ind.—CBJ
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Peerless Electric Products, 6920 McKinley Ave., Los Angeles 1, Calif.—CAU, CAV
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Philco Corp., C & Tioga Sts., Philadelphia 34, Pa.—CAP
Phillips Control Corp., 84 W. Jefferson St., Joliet, Ill.—CAM, CAN, CAO
Planet Mfg. Co., 225 Belleville Ave., Bloomfield, N. J.—CAB
POLORAD ELECTRONICS CORP., 100 Metropolitan Ave., Brooklyn 11, N. Y.—CBI
Potter & Brumfield, Princeton, Ind.—CAN, CAO
Precise Development Corp., 999 Long Beach Rd., Oceanside, L. I., N. Y.—CAH, CAI, CAJ, CAP
PRECISION PAPER TUBE CO., 2035 W. Charleston St., Chicago 47, Ill.—CBJ
Precision Rectifier Corp., 193 Grand St., Brooklyn 11, N. Y.—CAL
Precision Resistor Co., 334 Badger Ave., Newark 8, N. J.—CAP
Press Wireless Mfg., Cantiague Rd., Hicksville, N. Y.—CAB, CAC, CAD, CAE, CAF, CAG, CAH, CAI, CAJ
Price Electric Corp., Frederick, Md.—CAM, CAN, CAO
Pyramid Electric Co., 1445 Hudson Blvd., North Bergen, N. J.—CAC, CAD, CAE, CAH
Radio Components Inc., 28 N. Halsted St., Chicago 6, Ill.—CAP
RADIO CORP. OF AMERICA, TUBE DEPT., 415 S. 5th St., Harrison, N. J.—CAU, CAV
Radio Materials Corp., 1708 W. Belmont St., Chicago 13, Ill.—CAC, CAW
Radio-Music Corp., 84 S. Water St., Port Chester, N. Y.—CAU
RADIO RECEPTOR CO., 251 W. 19th St., New York 11, N. Y.—CAL
Raytheon Mfg. Co., Willow St., Waltham, Mass.—CAL,
Ram Electronics Inc., S. Buckhout St., Irvington, N. Y.—CAV
Raypar, Inc., 7800 W. Addison St., Chicago, Ill.—CBL
Raytheon Mfg. Co., Willow St., Waltham, Mass.—CAL, CAU, CAV
RBM Mfg. Co., 200 Hanna St., Logansport, Ind.—CAO
Rectifier Engineering Co., 1803 E. 7th St., Los Angeles 24, Calif.—CAL
REEVES SOUNDCRAFT CORP., 10 E. 52nd St., New York 22, N. Y.
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Rockbestos Products Corp., 285 Nicoll St., New Haven 4, Conn.—CAA
Rola Co., 2330 Superior Ave., Cleveland 14, Ohio—CAU
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Sangamo Electric Co., Converse Ave. & 11th St., Springfield, Ill.—CAB, CAC, CAD, CAE
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Silver Co., McMurdo, 417 Lafayette St., New York, N. Y.—CAJ
SIMPSON ELECTRIC CO., 5208 W. Kinzie St., Chicago 44, Ill.—CBO
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Sola Electric Co., 4633 W. 16th St., Chicago 50, Ill.—CAV
Solar Mfg. Corp., 2660 E. 46th St., Los Angeles 58, Calif.—CAC, CAW, CBD
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Square Root Mfg. Corp., 391 Saw Mill River Rd., Yonkers, N. Y.—CAD, CAE, CAF, CAI, CAJ
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Standard Arcturus Corp., 54 Clark St., Newark 4, N. J.—CAL
Standard Coil Products Co., 2329 N. Pulaski Rd., Chicago 39, Ill.—CAH, CAJ
Standard Electrical Products Co., 400 E. First St., Dayton 2, Ohio—CAU, CAV, CBH
Standard Transformer Corp., 3580 Elston Ave., Chicago 18, Ill.—CAI, CAJ, CAL, CAU, CAV
Stevens-Arnold Co., 22 Elkins St., S. Boston 27, Mass.—CAN
Struthers-Dunn, Inc., 150 N. 13th St., Philadelphia 7, Pa.—CAG, CAM, CAN, CAO
Super Electric Products Corp., 46 Oliver St., Newark, N. J.—CAU
Switchcraft, Inc., 1328 N. Halstead St., Chicago 22, Ill.—CAX, CAY
Tartak-Stolle Electronics, Inc., 3970 S. Grand Ave., Los Angeles 37, Calif.—CAU, CAV
TARZIAN, INC., SARKES, 539 S. Walnut St., Bloomington, Ind.—CAL, CAQ
Tech Laboratories, Inc., Bergen & Edsall Blvds., Palisades Park, N. J.—CAT
Telectro Industries Corp., 35-16 37th St., Long Island City 1, N. Y.—CAT
TELEX, INC., Telex Park, Minneapolis 1, Minn.—CAP
Tel-Rad, Fennimore, Wisc.—CAM, CAN, CAV
Thermador Electrical Mfg. Co., 5119 S. District Blvd., Los Angeles 22, Calif.—CAU, CAV
Thordarson Meissner Divs., Maguire Industries, Inc., 500 W. Huron St., Chicago 10, Ill.—CAU, CAV
Torocoil Co., 1002 Blendon Ave., Richmond Heights 17, Mo.—CAI
Trenton Transformer Corp., Box 568, Trenton, N. J.—CAI, CAU, CAV
Triad Transformer Mfg. Co., 2254 Sepulveda Blvd., Los Angeles 4, Calif.—CAU, CAV
U. S. Rubber Co., Electrical Wire & Cable Dept., 1230 Ave. of the Americas, New York, N. Y.—CAA
United Transformer Corp., 150 Varick St., New York 13, N. Y.—CAI, CAJ, CAU, CAV
Utah Radio Products Co., 1123 E. Franklin St., Huntington, Ind.—CAU
Vacuum Tube Products, 506 S. Cleveland St., Oceanside, Calif.—CAF
Variable Condenser Corp., 63 Hope St., Brooklyn 11, N. Y.—CBD, CAL
Varo Mfg. Co., Box 638, Garland, Texas—CAN, CAO
Vokar Corp., 7300 Huron River Dr., Dexter, Mich.—CAH
Ward Leonard Electric Co., 115 McQueston Pkwy., Mt. Vernon, N. Y.—CAM, CAN, CAO, CAP
WESTINGHOUSE ELECTRIC CORP., CONSTRUCTION & COMMUNICATIONS SEC. 10-L,, E. Pittsburgh, Pa.—CAI, CAL, CAO, CAU, CAV
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30—Services

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Apex Film Corp., 971 N. La Cienega Blvd., Los Angeles 46, Calif.—HAK
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Audio Productions, Inc., 630 Ninth Ave., New York 19, N. Y.—HAK
BACKGROUND ENGINEERS, 6511 DeLongpre, Hollywood 28, Calif.—HAQ, HAU
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Brinkley Recording Co., 232 E. Erie St., Chicago 11, Ill.—HAC, HAK, HAL, HAR, HAW, HAX
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Chicago Film Laboratory, Inc., 56 E. Superior St., Chicago 11, Ill.—HAK
C & G Film Effects, 723 7th Ave., New York 19, N. Y.—HAC, HAK, HAL, HAR
Church Productions, Arthur B., Pickwick Hotel, Kansas City 6, Mo.—HAK, HAQ, HAV
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Cineffects, Inc., 115 W. 45th St., New York 19, N. Y.—HAR
Cinemart, Inc., 101 Park Ave., New York 17, N. Y.—HAC, HAR, HAW, HAX
Cinema Research Corp., 7000 Romaine St., Hollywood 38, Calif.—HAG, HAR
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Coax-Electronics Co., 1524 E. 15th St., Brooklyn 30, N. Y.—HAA, HAB
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Colonial Films, 2118 Mass. Ave., N.W., Washington S., D. C.—HAC, HAF, HAG, HAK, HAL, HAR, HAT, HAV, HAW, HAX
Columbia Records, Inc., 1473 Barnum Ave., Bridgeport, Conn.—HAH, HAN
Columbia Transcriptions, 799 7th Ave., New York 19, N. Y.—HAN
Commerce Pictures, 525 Poydras St., New Orleans, La.—HAK
Commercial Radio Monitoring Co., P. O. Box 7037, Kansas City, Mo.—HAS
Commercial Radio-Sound Corp., 231 E. 47th St., New York 17, N. Y.—HAA, HAB
Commonwealth Pictures Corp., 723 Seventh Ave., New York 19, N. Y.—HAQ
Communications Co., Inc., 300 Greco Ave., P. O. Drawer 6250, Coral Gables, Fla.—HAB
Cowan, Inc., Louis G., 485 Madison Ave., New York 22, N. Y.—HAK, HAL, HAV
Culhane Productions, Shamus, 440 W. 34th St., New York, N. Y.—HAK, HAL, HAQ, HAV
Custom Craft Mfg. Co., 256 E. 98th St., Brooklyn 12, N. Y.—HAA, HAB
Damon Recording Studios, Inc., 1221 Baltimore Ave., Kansas City 6, Mo.—HAC, HAK, HAN
Daven Co., 191 Central Ave., Newark, N. J.—HAB
Day Productions, Gordon M., 108 E. 30th St., New York 16, N. Y.—HAK, HAL, HAN, HAV
Decca Records, Inc., 50 W. 57th St., New York 19, N. Y.—HAD, HAN
DeFrenes Co., 1909 Buttonwood St., Philadelphia 30, Pa.—HAK
Dephoure Studios, 782 Commonwealth Ave., Boston 15, Mass.—HAK
Depicto Films, Inc., 254 W. 54th St., New York 19, N. Y.—HAK
Disney Productions, Walter, Burbank, Calif.—HAK
Dubois Co., Jean, 2214 Dahlia St., Denver 7, Colo.—HAK
Dudley Pictures Corp., 9908 Santa Monica Blvd., Beverly Hills, Calif.—HAK, HAL
Dunn Studios, Cal., 104 S. Michigan Ave., Chicago 3, Ill.—HAC, HAK, HAL, HAV
Dynamic Films, Inc., 112 W. 89th St., New York 24, N. Y.—HAC, HAF, HAK, HAL, HAR, HAT, HAW, HAX
Eastman Kodak Co., 243 State St., Rochester 4, N. Y.—HAC, HAF, HAK, HAL, HAR, HAT, HAW, HAX
Eidson Electronic Co., 1802 N. Third St., Temple, Texas—HAS
Eichwald & Co., B., 51 E. 42nd St., New York 17, N. Y.—HAA
Electronic Tube Corp., 1200 E. Mermaid Lane, Philadelphia 18, Pa.—HAA, HAB
Equipment & Service Co., 6815 Oriole Drive, Dallas 9, Texas—HAA, HAB
Fairbanks, Inc., Jerry, 6052 Sunset Blvd., Hollywood 28, Calif.—HAK, HAL
Fairchild Recording Equipment Corp., 154th St. & 7th Ave., Whitestone, N. Y.—HAB
Famous Artists Corp., California Bank Bldg., Beverly Hills, Calif.—HAK
Federal Artists Corp., 8734 Sunset Blvd., Hollywood 46, Calif.—HAV
Federal Telecommunication Laboratories, Inc., 500 Washington Ave., Nutley 10, N. J.—HAA, HAE
Federated Television Productions, 41 E. 41st St., New York 17, N. Y.—HAK, HAL, HAR, HAW, HAX
Fennell Co., Paul J., 1159 N. Highland Ave., Hollywood 38, Calif.—HAK
Film Associates, Inc., 440 E. Schantz Ave., Dayton 9, Ohio—HAC, HAG, HAK, HAL, HAM, HAN, HAR, HAW, HAX
Filmack Corp., 1327 S. Wabash Ave., Chicago 5, Ill.—HAC, HAG, HAH, HAK, HAL, HAR, HAW, HAX
Filmeffects of Hollywood, 1153 N. Highland Ave., Hollywood, Calif.—HAJ, HAL, HAO
Film Equities Corp., 1501 Broadway, New York 19, N. Y.—HAK, HAL
Film Features Associates, 661 West End Ave., New York 25, N. Y.—HAK, HAL, HAN, HAU
Film Graphics, Inc., 245 W. 55th St., New York, N. Y.—HAK, HAL
Film-Makers, Inc., 1600 Broadway, New York 19, N. Y.—HAK
Film Research Associates, 150 E. 52nd St., New York 22, N. Y.—HAK, HAL, HAM, HAN, HAR, HAU
Films for Industry, 135 W. 52nd St., New York 19, N. Y.—HAK
Fish-Schurman Corp., 70 Portman Rd., New Rochelle, N. Y.—HAE, HAJ
Five Star Productions, 6526 Sunset Blvd., Hollywood 28, Calif.—HAK, HAL, HAV
Flexon Products Corp., 249 W. 34th St., New York 1, N. Y.—HAJ, HAR
Florez, Inc., 815 Bates St., Detroit 26, Mich.—HAK
Flory Films, Inc., 303 E. 71st St., New York 21, N. Y.—HAC, HAG, HAH, HAK, HAL, HAR, HAV, HAW, HAX
Fox Movietone News, 460 W. 54th St., New York, N. Y.—HAK, HAT
Funt Radio Productions, Allen A., 100 Central Park S., New York 17, N. Y.—HAK, HAL
Gale Dorothea Mechanisms, 81-01 Broadway, Elmhurst, L. I., N. Y.—HAO
Gamble Productions, Inc., 129 E. 58th St., New York, N. Y.—HAK, HAT, HAQ
Ganz Co., William J., 40 E. 49th St., New York 17, N. Y.—HAK
Gates Radio Co., Quincy, Ill.—HAA
General Pictures Productions, Inc., 621 Sixth Ave., Des Moines 9, Iowa—HAC, HAG, HAK, HAR
Goodman Radio & TV Productions, Harry S., 19 E. 53rd St., New York 22, N. Y.—HAK, HAL, HAV, HAX
Gotham Recording Corp., 2 W. 46th St., New York, N. Y.—HAH, HAN, HAV, HAW
Gray-O-Reilly Studios, 480 Lexington Ave., New York, N. Y.—HAK, HAL
Gray Research & Development Co., 16 Arbor St., Hartford, Conn.—HAB, HAJ, HAV
Gulton Mfg. Corp., 212 Durham Ave., Metuchen, N. J.—HAB
Handy Organization, Jam, 2821 E. Grand Blvd., Detroit 11, Mich.—HAB, HAC, HAD, HAJ, HAK, HAL, HAM, HAN, HAO, HAP, HAQ, HAR, HAV, HAW, HAX
Hartley Productions, 20 W. 47th St., New York 19, N. Y.—HAK, HAV
Harvard Film Service, 421 Washington St., Somerville, Mass.—HAK, HAL, HAV
Hathen Productions, 246 S. Van Pelt St., Philadelphia, Pa.—HAK, HAQ
Hayes-Parnell Productions, 6000 Sunset Blvd., Hollywood 28, Calif.—HAK, HAV
Helm, E., "Tex," 407 S. Canal St., Carlsbad, N. Mex.—HAT
Hollysmith Pictures, Inc., 106 S. Church St., Charlotte, N. C.—HAK
Houghton Laboratories, Inc., 322 Bush St., Olean, N. Y.—HAJ
Howell Recording Studio, 2703 Delaware Ave., Buffalo 17, N. Y.—HAC, HAN, HAW
Hubbel & Assoc., Richard W., 315 E. 56th St., New York 22, N. Y.—HAA, HAK, HAL, HAV
Imperial Chemical Industries of N. Y., Ltd., 521 5th Ave., New York 17, N. Y.—HAE
International Movie Producers' Service, 515 Madison Ave., New York 22, N. Y.—HAH, HAL, HAP, HAR, HAW, HAX
International News Service, 235 E. 45th St., New York 17, N. Y.—HAT
International Trans-Video, 61 E. 52nd St., New York 14, N. Y.—HAK, HAV
Intervox Corp., 1846 Westlake N., Seattle 9, Wash.—HAA, HAB
Insuline Corp. of America, 3602 35th Ave., Long Island City 1, N. Y.—HAH
Jamieson Film Co., 3825 Bryan St., Dallas, Texas—HAK
Johnston Productions, Inc., Bert, 8204 Blue Ash Rd., Cincinnati 36, Ohio—HAK
Jones Productions, Dallas, 1725 N. Wells St., Chicago 14, Ill.—HAK
Kalbfell Laboratories, Inc., 1090 Morena Blvd., San Diego 10, Calif.—HAA, HAB
K-F Development Co., 820 Woodside Way, San Mateo, Calif.—HAB
Kepco Laboratories, Inc., 149-14 41st Ave., Flushing 55, N. Y.—HAA, HAB
Kin-O-Lux, Inc., 105 W. 40th St., New York 18, N. Y.—HAG
Kling Studio, Inc., 601 N. Fairbanks Ct., Chicago, Ill.—HAC, HAF, HAK, HAL, HAM, HAN, HAO, HAQ, HAR, HAT, HAU, HAW, HAX
Knickerbocker Productions, Inc., 1600 Broadway, New York 19, N. Y.—HAK, HAL, HAM, HAR
K & S Films, 50 N. West St., Indianapolis 2, Ind.—HAC, HAK, HAL, HAR, HAV, HAW, HAX
Langevin Mfg. Corp., 37 W. 65th St., New York 23, N. Y.—HAB
Lang-Worth Feature Programs, 113 W. 57th St., New York 19, N. Y.—HAC, HAH, HAV, HAX
Lehman, Harry, 1161 N. Highland Ave., Hollywood 38, Calif.—HAK, HAL
Libra Films Distributors, 6525 Sunset Blvd., Hollywood 28, Calif.—HAC, HAK, HAL, HAP, HAQ, HAR, HAT
Lloyds Film Storage Corp., 729 Seventh Ave., New York, N. Y.—HAJ, HAP
London Film Productions, 350 5th Ave., New York, N. Y.—HAK, HAQ, HAU
Loucks & Norling Studios, Inc., 245 W. 55th St., New York 19, N. Y.—HAK, HAL, HAM, HAR, HAV
McLarty Pictures Productions, 45 Stanley St., Buffalo 6, N. Y.—HAK
McCollum Picture Productions, 4557 Produce Plaza W., Los Angeles 58, Calif.—HAC, HAG, HAK, HAL, HAR, HAV, HAX
Mannon Sound Stages, Inc., 112 W. 89th St., New York 24, N. Y.—HAC, HAO, HAR, HAW, HAX
Manufacturers Research Corp. 17 W. Mulbetty St., Baltimore 1, Md.—HAA, HAV
March of Time, 369 Lexington Ave., New York 19, N. Y.—HAK
Master Motion Picture Co., 50 Piedmont St., Boston 16, Mass.—HAK
Maxson Corp., W. L., 460 W. 34th St., New York 1, N. Y.—HAA
Maxwell Associates, Robert, 480 Lexington Ave., New York 17, N. Y.—HAK, HAV
Mercury International Pictures, Inc., 1415 Coast Blvd., Corona del Mar, Calif.—HAK
Meyers, James G., 1056 Sheridan Ave., Bronx, N. Y. 56, N. Y.—HAA, HAB
Michigan Film Library, 15745 Rosemont, Detroit, Mich.—HAQ
Micro Engineering Corp., 15 E. Tujunga Ave., Burbank, Calif.—HAG, HAR
Mode-Art Pictures, Inc., 1022 Forbes St., Pittsburgh 19, Pa.—HAK
Motion Picture Productions, Inc., Sixth & Superior Sts., W., Cleveland 13, Ohio—HAK
MP Concert Installations, Fairfield 10, Conn.—HAB, HAC, HAE
Murphy-Lillis Productions, 59 Park Ave., New York 16, N. Y.—HAK, HAL
National Cine Equipment, Inc., 20 W. 22nd St., New York 10, N. Y.—HAP, HAV
National TV Laboratories, 4350 Lankersheim Blvd., N. Hollywood 16, Calif.—HAK, HAL
Nemeth Studios, Ted, 729 7th Ave., New York 19, N. Y.—HAK, HAL
New World Productions, 5746 Sunset Blvd., Hollywood, Calif.—HAK
Northwest Motion Pictures, 1716 Thirtieth Ave., W., Seattle 99, Wash.—HAK
Nu-Art Films, Inc., 145 W. 45th St., New York 19, N. Y.—HAK
O'Brien Electric Co., 5326 Sunset Blvd., Hollywood 27, Calif.—HAA
Official Television, Inc., 25 W. 45th St., New York 19, N. Y.—HAK, HAL
Olesen Co., Otto K., 1534 Cahuenga Blvd., Hollywood 28, Calif.—HAB
Orleans & Associates, Inc., Sam, 211 W. Cumberland Ave., Knoxville 15, Tenn.—HAK
Packaged Programs, Inc., 634 Penn Ave., Pittsburgh 22 Pa.—HAG, HAK, HAL, HAM, HAN, HAR, HAT, HAU
Paragon Pictures, Inc., 2540 Eastwood Ave., Evanston, Ill.—HAK
Paramount TV Productions, Inc., 1501 Broadway, New York 18, N. Y.—HAE, HAF, HAX
Pathe Laboratories, 105 E. 106th St., New York, N. Y.—HAG, HAR
Pathescope Co. of America, 580 Fifth Ave., New York 19, N. Y.—HAK, HAL
Peerless Film Processing Corp., 165 W. 46th St., New York 19, N. Y.—HAG, HAV
Photo & Sound Productions, 116 Natoma St., San Francisco 5, Calif.—HAK
Precision Film Laboratories, Inc., 21 W. 46th St., New York 19, N. Y.—HAG
Princeton Film Center, Inc., Princeton, N. J.—HAK, HAL, HAW, HAX
Process & Instruments, 60 Greenpoint Ave., Brooklyn 22, N. Y.—HAA, HAB
Producers Service Co., 2704 W. Olive Ave., Burbank, Calif.—HAP
Radio Corp. of America, RCA-Victor Div., Camden, N. J.—HAF
Radio Engineering Laboratories, Inc., 36-40 37th St., Long Island City 1, N. Y.—HAA, HAB
Radio-Music Corp., 84 South Water St., Port Chester, N. Y.—HAB
Radio Recorders, 7000 Santa Monica Blvd., Hollywood, Calif.—HAB, HAC, HAD, HAH, HAR, HAW
Rangertone, Inc., 73 Winthrop St., Newark, N. J.—HAC, HAP, HAR
Rarig Motion Picture Co., 5514 University Way, Seattle 5, Wash.—HAK
Ray Film Industries, Reid H., 2269 Ford Parkway, St. Paul 1, Minn.—HAK
RCA Communications, Inc., 66 Broad St., New York 4, N. Y.—HAS, HAU
RCA Recorded Program Services, 120 E. 23rd St., New York 10, N. Y.—HAC, HAH, HAN, HAU
Recorders Labs, Inc., 6916 Santa Monica Blvd., Hollywood 38, Calif.—HAC, HAH, HAN
Reed Productions, Inc., Roland, 275 S. Beverly Dr., Beverly Hills, Calif.—HAK
Reeves Soundcraft Corp., 10 E. 52nd St., New York 22, N. Y.—HAE
Reeves Sound Studios, 304 E. 44th St., New York 19, N. Y.—HAB, HAC, HAL, HAN, HAR, HAW
RKO-Pathe, 625 Madison Ave., New York 22, N. Y.—HAK, HAL
Roach Studios, Hal, 8822 Washington Blvd., Culver City, Calif.—HAK, HAL
Rocheont Assoc., Louis de, 35 W. 45th St., New York, N. Y.—HAK, HAL, HAQ
Rocket Pictures, Inc., 6108 Santa Monica Blvd., Hollywood 38, Calif.—HAK
Rockett Co., Frederick K., 6063 Sunset Blvd., Hollywood 28, Calif.—HAK
Rolab Photo-Science Labs., Sandy Hook, Conn.—HAK
Roquemore Films, 42 Pearl St., Buffalo 2, N. Y.—HAK
Rousch Productions, Leslie, 333 W. 52nd St., New York 19, N. Y.—HAK, HAL
Rowe Industries, 1702 Wayne St., Toledo 9, Ohio—HAA, HAB
Roy, Inc., Ross, 2751 E. Jefferson Ave., Detroit 7, Mich.—HAK
Royal Recording Co., 601 Ashby Ave., Berkeley 10, Calif.—HAC, HAW
Ruby Film Co., 729 Seventh Ave., New York, N. Y.—HAP, HAQ, HAR
Rutherford Electronics Co., 3724½ S. Robertson Blvd., Culver City, Calif.—HAA
Sackett Productions, Bernard L., Bankers Securities Bldg., Philadelphia 7, Pa.—HAU
Sarra, Inc., 16 Ontario St., Chicago 11, Ill.—HAK, HAL
Schumaker Construction Co., Michigan City, Ind.—HAA
Science Pictures, Inc., 5 E. 57th St., New York 22, N. Y.—HAK

Using the Index

An alphabetical manufacturers' index and a separate product index have been prepared for your convenience. The product index appears on page 85 and the index of manufacturers begins on page 87.

Sesac, Inc., 475 Fifth Ave., New York 17, N. Y.—HAH, HAU
Sherwood Pictures Corp., 1569 Broadway, Brooklyn 7, N. Y.—HAQ, HAU
Shrader Mfg. Co., 2803 M. St., N.W., Washington, D. C. HAA, HAB
Simmel-Meservey, Inc., 321 S. Beverly Dr., Beverly Hills, Calif.—HAH, HAK, HAQ, HAU, HAX
Skiatron Electronics and Television, 30 E. 10th St., New York, N. Y.—HAE
Smith-Meeker Engineering Co., 157 Chambers St., New York 7, N. Y.—HAA, HAB
Sound Masters, Inc., 165 W. 46th St., New York 19, N. Y.—HAK
Southwestern Industrial Electronics Co., 2831 Post Oak Rd., P.O. Box 13058, Houston 19, Texas—HAB
Souvaine Co., 30 Rockefeller Plaza, New York 20, N. Y.—HAU
Special Purpose Films, Inc., 44 W. 56th St., New York 19, N. Y.—HAK
Standard Transformer Corp., 3580 Elston Ave., Chicago 18, Ill.—HAB
Stephens Mfg. Corp., 8538 Warner Dr., Culver City, Calif.—HAA, HAB
Sun Dial Films, Inc., 341 E. 43rd St., New York 17, N. Y.—HAK, HAL, HAM, HAR, HAU, HAW, HAX
Sutherland Productions, Inc., John, 201 N. Occidental Blvd., Los Angeles 26, Calif.—HAK
Swank Films, 19. W. Fourth St., Dayton 2, Ohio—HAX
Tape Recording Apparatus Co., Box 221, Caldwell, N. J.—HAB
Technicolor Motion Picture Corp., Hollywood, Calif.—HAG, HAK
Telechrome, Inc., 88 Merrick Rd., Amityville, L. I., N. Y.—HAA, HAF
Telefilm, Inc., 6039 Hollywood Blvd., Hollywood 28, Calif.—HAC, HAD, HAF, HAH, HAK, HAL, HAQ, HAR, HAW, HAX
Telemated Cartoons, 70 E. 45th St., New York 17, N. Y.—HAK, HAL, HAM, HAR
Telenews Productions, Inc., 630 Ninth Ave., New York 19, N. Y.—HAK, HAL, HAR, HAT, HAU
Telepix Corp., 6233 Hollywood Blvd., Hollywood 28, Calif.—HAC, HAD, HAK, HAL, HAM, HAN, HAR, HAW, HAX
Teletran, 480 Lexinggton Ave., New York 17, N. Y.—HAK
Television Cartoons, Inc., 361 W. Broadway, New York 13, N. Y.—HAC, HAK, HAL, HAQ, HAR
Television Screen Productions, 17 E. 45th St., New York 17, N. Y.—HAK, HAL
Tele-Visual Productions, 913 Walnut St., Des Moines 9, Iowa—HAK
Tempo Record Co. of America, 8540 Sunset Blvd., Hollywood 28, Calif.—HAH
Texas Industrial Film Co., 919 M & M Bldg., Houston 2, Texas—HAK
Tonechek Recordings, 11 Pleasant Ct., Maywood, N. J.—HAA, HAC, HAD, HAN
Tower Construction Co., 107 4th St., Sioux City, Iowa—HAA
Transfilm, Inc., 35 W. 45th St., New York 19, N. Y.—HAK, HAL
TransLux Corp., 1270 6th Ave., New York 20, N. Y.—HAJ
Tressel Television Productions, Inc., 11 S. La Salle St., Chicago 3, Ill.—HAK, HAL, HAM, HAX
Tri-State 16 mm. Productions, P.O. Box 112, Pittsburgh 30, Pa.—HAC, HAJ, HAK, HAL, HAQ, HAR, HAU, HAX
Twentieth Century Fox Co., 444 W. 56th St., New York, N. Y.—HAK, HAL
United World Films, Inc., 1445 Park Ave., New York 29, N. Y.—HAK, HAL, HAM, HAQ
Universal Recorders, 6757 Hollywood Blvd., Hollywood 28, Calif.—HAC, HAN
Victorlite Ind., Inc., 5350 Second Ave., Los Angeles 43, Calif.—HAM
Video Films, 1004 E. Jefferson Ave., Detroit 7, Mich.—HAK, HAL, HAM, HAN, HAR
Video Film Transcriptions, 3100 W. Magnolia St., Burbank, Calif.—HAK
Video Varieties Corp., 41 E. 50th St., New York 22, N. Y.—HAK, HAL, HAR, HAW, HAX
Vista Productions, 12 E. 41st St., New York, N. Y.—HAK, HAL
Visual Methods, Inc., 336 Second Natl. Bk. Bldg., Akron, Ohio—HAK
Vogue Wright Studios, 237 E. Ontario St., Chicago 11, Ill.—HAK, HAL, HAM, HAN, HAR, HAU, HAX
Walker Productions, Gene K., 465 California St., San Francisco 4, Calif.—HAK
Waveforms, Inc., 333 Sixth Ave., New York 14, N. Y.—HAA, HAB
West Coast Sound Studios, 510 W. 57th St., New York 19, N. Y.—HAK, HAL, HAX
Western Colorfilms, 1536 S. E. Eleventh Ave., Portland 14, Ore.—HAK
Wheeler Laboratories, 259-09 Northern Bld., Great Neck, L. I., N. Y.—HAA
Wilding Picture Productions, 1345 Argyle St., Chicago 40, Ill.—HAK, HAL
Willard Pictures, Inc., 45 W. 45th St., New York 19, N. Y.—HAK
Williams, Brown & Earle, Inc., 918 Chestnut St., Philadelphia 7, Pa.—HAM, HAP, HAV
Winik Films, Inc., 625 Madison Ave., New York, N. Y.—HAK, HAL
Wolff Studios, Raphael G., 1714 N. Wilton Pl., Hollywood 28, Calif.—HAK
Woodruff Associates, 831 First Ave., New York 22, N. Y. HAK, HAL, HAM, HAO, HAP, HAR, HAU, HAV, HAW, HAX
World Broadcasting System, 501 Madison Ave., New York 22, N. Y.—HAH, HAU
WOR Recording Studios, 1440 Broadway, New York 18, N. Y.—HAN, HAW
ZIV CO., Frederick W., 1529 Madison Rd., Cincinnati 6, Ohio—HAH, HAN, HAU

31—Batteries

Dry ..... GAA
Dry, portable ..... GAB
Hearing Aid type ..... GAC
Nickel-Alkaline ..... GAD
Storage, fixed ..... GAE
Storage, portable ..... GAF

Acme Battery Co., 59 Pearl St., Brooklyn, N. Y.—GAA
BERNDT-BACH, INC., DIV. AURICON, 7325 Beverly Blvd., Los Angeles 36, Calif.—GAA, GAB, GAE, GAF
Bond Electric Corp., Div. of Olin Industries, New Haven, 4, Conn.—GAB
Bright Star Battery Co., 200 Crooks Ave., Clifton, N. J. GAA, GAB
Burgess Battery Co., Freeport, Ill.—GAA, GAB, GAC
Edison Storage Battery Div., P. O. Box 543, Orange, N. J.—GAD, GAE, GAF
Electric Storage & Battery Co., Allegheny Ave. & 19th St., Philadelphia 32, Pa.—GAE, GAF
Electronic Batteries, Inc., 34 35th St., Brooklyn 32, N. Y.—GAF
GATES RADIO CO., Quincy, Ill.—GAB
General Dry Batteries, Inc., 13000 Athens Ave., Cleveland 7, Ohio—GAA
GENERAL ELECTRIC CO., ELECTRONICS DEPT., Syracuse, N. Y.—GAA, GAB
National Carbon Co., 30 E. 42nd St., New York 17, N. Y. —GAB
Nickel Cadmium Battery Corp., Easthampton, Mass.—GAD, GAE, GAF
Olin Industries, Inc., Winchester Ave., New Haven 4, Conn.—GAB
RADIO CORP. OF AMERICA, RCA-VICTOR DIV., Camden, N. J.—GAA, GAB
Ray-O-Vac Co., 212 Washington St., Madison, Wisc.—GAB, GAD
Sonotone Corp., Box 200, Elmsford, N. Y.—GAD
Specialty Battery Co., 212 E. Washington Ave., Madison 3, Wisc.—GAA, GAB
Stancil-Hoffman Corp., 1016 N. Highland Ave., Hollywood 28, Calif.—GAF
Standard Electric Time Co., 89 Logan St., Springfield 2, Mass.—GAD
Willard Storage Battery Co., 246 E. 131st St., Cleveland 1, Ohio—GAB, GAE, GAF
Williams, Brown & Earle, Inc., 918 Chestnut St., Philadelphia 7, Pa.—GAB, GAC
Yardney Electric Corp., 105 Chambers St., New York 7, N.Y.—GAE, GAF

32—Power Supplies

Chargers, battery ..... IAA
Converters
Rotary ..... IAB
Vibrator ..... IAC
Material, brush and contact ..... IAK
Regulators
60 cps ..... IAD
400 cps ..... IAE
Sets, generator engine driven ..... IAF
Supplies
AC/DC ..... IAG
Regulated power ..... IAH
Special purpose ..... IAI
Variable frequency ..... IAJ

Accurate Engineering Co., 2005 Blue Island Ave., Chicago 8, Ill.—IAA, IAG, IAH, IAI
Aerocoil, Inc., 507 26th St., Union City, N. J.—IAG, IAH, IAI, IAJ
Allis Chalmers Mfg. Co. (Inc.), 935 S. 70 St., Milwaukee 1, Wisc.—IAD, IAE
Altec Lansing Corp., 9356 Santa Monica Blvd., Beverly Hills, Calif.—IAH
American Bosch Corp., Springfield 7, Mass.—IAA
American Communications Corp., 306 Broadway, New York, N. Y.—IAA, IAC, IAI
American Electroneering Co., 5025-19 W. Jefferson Blvd. Los Angeles 16, Calif.—IAH
Amplifier Corp. of America, 398 Broadway, New York 13, N. Y.—IAC, IAH, IAI
Antenna Research Laboratory, Inc., 797 Thomas Lane, Columbus 14, Ohio—IAJ
Applied Science Corp. of Princeton, P. O. Box 44, Princeton, N. J.—IAH, IAI
Bendix Aviation Corp., Eclipse-Pioneer Div., Teterboro, N. J.—IAB, IAE, IAF, IAI
Bendix Aviation Corp., Red Bank Div., Red Bank, N. J. —IAB, IAH
Berkeley Custom Electronics, 2571 Shattuck Ave., Berkeley 4, Calif.—IAI
Berndt-Bach, Inc., Auricon Div., 7325 Beverly Blvd., Los Angeles 36, Calif.—IAB, IAC, IAG, IAJ
Beta Electric Co., 333 E. 103 St., New York 29, N. Y.—IAC
Bliss-Warren Electronic Corp., Sussex Airport, Box 123, Sussex, N. J.—IAG
Booth Co., Arthur E., 4124 Beverly Blvd., Los Angeles 4, Calif.—IAG, IAH, IAI
Brociner Electronics, Laboratory, 1546 Second Ave., New York 28, N. Y.—IAH
Brush Development Co., 3405 Perkins Ave., Cleveland 14, Ohio—IAI
Buck Engineering Co., 37 Marcy St., Freehold, N. J.—IAH, IAI
Buda Co., 154th & Commercial Aves., Harvey, Ill.—IAF
Carter Motor Co., 2654 N. Maplewood Ave., Chicago, Ill. —IAB
Caterpillar Tractor Co., Peoria 8, Ill.—IAF
Chatham Electronics Corp., 475 Washington St., Newark 2, N. J.—IAG, IAH, IAI
Coil Winders, Inc., 61 Bergen St., Brooklyn 2, N. Y.—IAA
Columbus Electronics Corp., 229 Waverly St., Yonkers, N. Y.—IAB
Communication Measurements Laboratory, Inc., 120 Greenwich St., New York 6, N. Y.—IAH, IAJ
Continental Electric Co., Geneva, Ill.—IAB
Cornell Dubilier Electric Corp., 333 Hamilton Blvd., S. Plainfield, N. J.—IAC, IAI
Cyclohm Motor Corp., Div. Howard Industries, Racine, Wisc.—IAF
Drake Co., R. L., 11 Longworth St., Dayton 2, Ohio—IAC, IAH, IAI, IAJ
DuMont Laboratories, Allen B., 1000 Main Ave., Clifton, N. J.—IAH
Eicor, Inc., 1501 W. Congress St., Chicago 7, Ill.—IAB, IAE, IAF, IAH, IAI, IAJ
Electric Regulator Corp., 1938 Park Ave., New York 35, N. Y.—IAD
Electric Specialty Co., 211 South St., Stamford, Conn.—IAB, IAF, IAH, IAI
Electrodyne Co., 32 Oliver St., Boston 10, Mass.—IAH, IAI
Electronic Associates, Inc., Long Branch Ave., Long Branch, N. J.—IAH, IAI, IAJ
Electronic Controls, 31-24 Avenue I, Brooklyn, N. Y.—IAY
Electronic Instrument Co., 276 Newport St., Brooklyn 12, N. Y.—IAA
Electronic Measurements Co., Red Bank, N. J.—IAE, IAG, IAH, IAI, IAJ
Electronic Rectifiers, Inc., 2102 Spann Ave., Indianapolis 3, Ind.—IAA
Electro Prods. Laboratories, 4501 N. Ravenswood Ave., Chicago 40, Ill.—IAA, IAG
Engineering Associates, 434 Patterson Rd., Dayton 9, Ohio—IAH, IAI, IAJ
Fairbanks-Morse & Co., 600 S. Michigan Ave., Chicago 5, Ill.—IAF, IAI
Fansteel Metallurgical Corp., North Chicago, Ill.—IAA, IAC, IAI
Federal Telecommunication Laboratories, Inc., 500 Washington Ave., Nutley 10, N. J.—IAA, IAF
Federal Telephone & Radio Corp., 100 Kingsland Rd., Clifton, N. J.—IAA, IAG, IAH
Fluke Engineering Co., Box 775, Springdale, Conn.—IAG
Freed Transformer Co., 1718 Weirfield St., Brooklyn 27, N. Y.—IAC, IAD
Furst Electronics, 12 S. Jefferson St., Chicago 6, Ill.—IAH, IAI, IAJ
General Electric Co., Electronics Dept., Syracuse, N. Y.—IAH, IAI
Graphite Metallizing Corp., 1002 Nepperhan Ave., Yonkers 3, N. Y.—IAK
Harvey Radio Labs., 447 Concord Ave., Cambridge 38, Mass.—IAH
Harvey-Wells Electronics, Inc., North St., Southbridge, Mass.—IAG, IAH, IAI, IAJ
Hastings Instrument Co., Inc., Super Highway & Pine Ave., Hampton, Va.—IAG, IAH, IAI
Hertner Electric Co., 12690 Elmwood Ave., Cleveland 11, Ohio—IAF
Howard Co., 934 Argyle Road, Drexel Hill, Pa.—IAI
Huggins Laboratories, 730 Hamilton Ave., Manlo Park, Calif.—IAI
Inductograph Prods., Inc., 236 W. 55th St., New York 19, N. Y.—IAG, IAH, IAI, IAJ
Jack & Heintz Precision Industries, 17600 Broadway, Cleveland 1, Ohio—IAF
Kato Engineering Co., Mankato, Minn.—IAF
Kay Electric Co., Maple Ave., Pine Brook, N. J.—IAH
Kepco Laboratories, Inc., 149-14 41st Ave., Flushing 55, N. Y.—IAA, IAG, IAH, IAI, IAJ
Kohler Co., Kohler, Wisc.—IAF
K-V Transformer Corp., 4412 Park Ave., New York 57, N. Y.—IAD, IAH
Lambda Electronics Corp., 103-02 Northern Blvd., Corona 68, N. Y.—IAG, IAH, IAI
Langegvin Mfg. Corp., 37 W. 65th St., New York 23, N. Y.—IAH, IAI, IAJ
Lee Electric & Mfg. Co., 2806 Clearwater St., Los Angeles 26, Calif.—IAC, IAD, IAH, IAI
Lorain Prods. Corp., 1122 "F" St., Lorain, Ohio—IAA, IAI, IAJ
McColpin-Christie Corp., Ltd., 3410 W. 67th St., Los Angeles 43, Calif.—IAA
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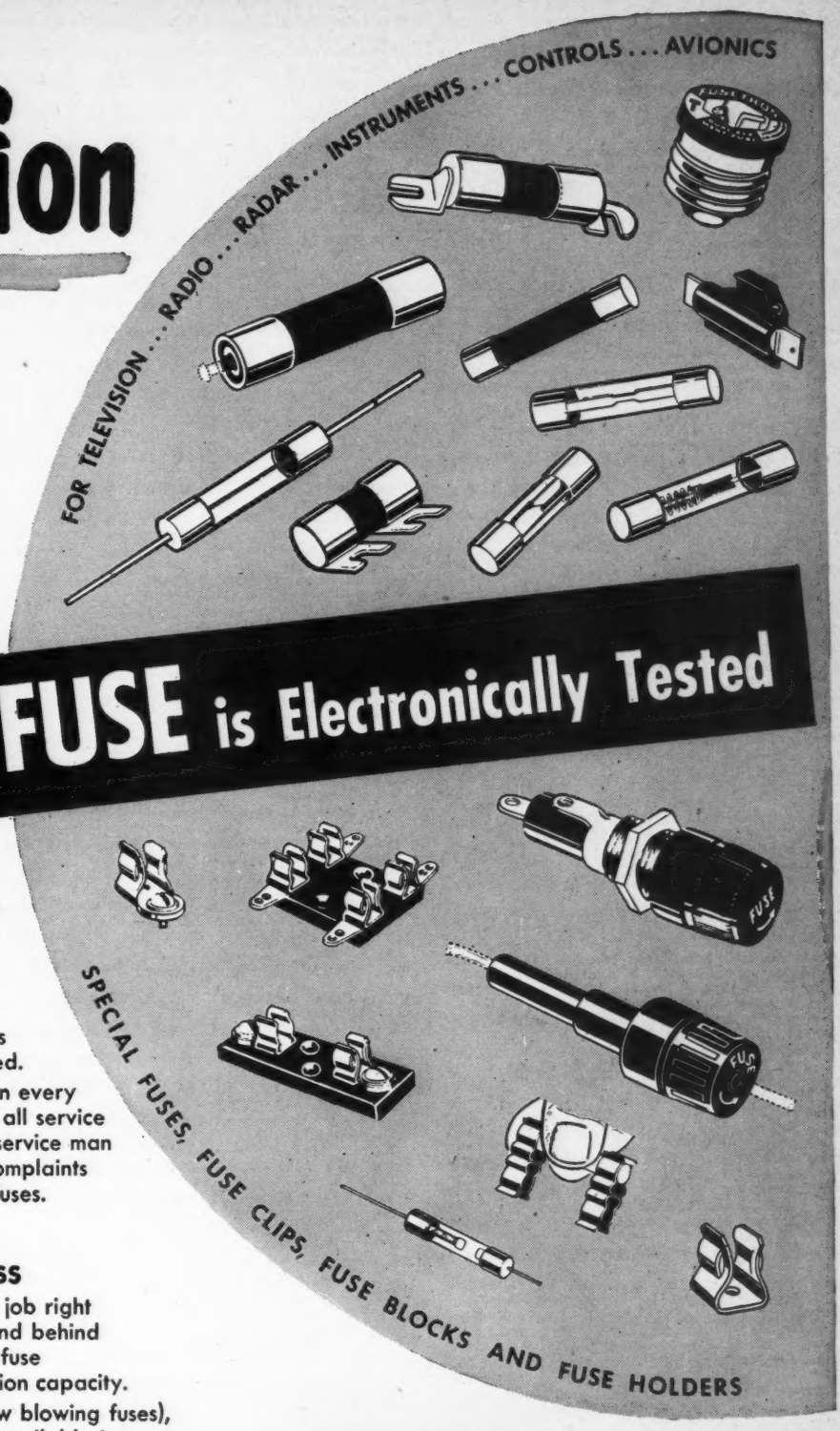

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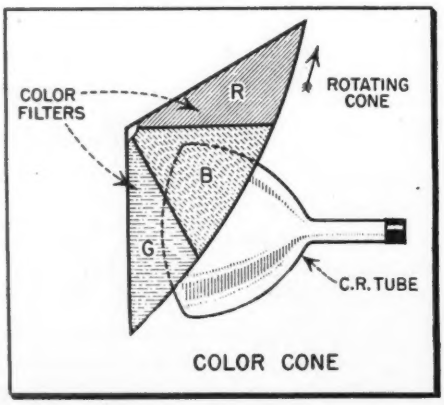

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Glasscraft Co., 5210 E. Olympic Blvd., Los Angeles 22, Calif.—DAF, DAJ

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Gray Research & Development Co., 16 Arbor St., Hartford, Conn.—DAA, DAF, DAJ

Gulton Mfg. Corp., 212 Durham Ave., Metuchen, N. J.—DAA, DAB, DAC, DAG, DAI, DAJ, DAN

Hallicrafters Co., 4401 W. Fifth Ave., Chicago 24, Ill.—DAI, DAN

Harvey Radio Laboratories, 447 Concord Ave., Cambridge 38, Mass.—DAA, DAB, DAC, DAD, DAF, DAG, DAI, DAK, DAL, DAM, DAN, DAO, DAP

Harvey-Wells Electronics, Inc., North St., Southbridge, Mass.—DAA, DAB, DAC, DAD, DAF, DAG, DAH, DAI, DAJ, DAK, DAM, DAN, DAO

Hastings Instrument Co., Super Highway & Pine Ave., Hampton, Va.—DAB, DAC, DAH, DAJ

Highland Engineering Co., Main & Urban Sts., Westbury, N. Y.—DAA, DAM

Holtzer-Cabot, 125 Amory St., Boston 19, Mass.—DAA

Holub Industries, Inc., Sycamore, Ill.—DAM

HOUSTON-FEARLESS CORP., 11801 W. Olympic Blvd., W. Los Angeles 64, Calif.—DAF

HUGHES AIRCRAFT CO., Culver City, Calif.—DAA, DAF, DAI, DAJ, DAM, DAN, DAO

Industrial Television, Inc., 359 Lexington Ave., Clifton, N. J.—DAF

International Derrick & Equipment Co., 875 Michigan Ave., Columbus 8, Ohio—DAF

Intervox Corp., 1846 Westlake, N. Seattle 9, Wash.—DAA

Jones Electronics Co., M. C., 96 N. Main St., Bristol, Conn.—DAA

Kaar Engineering Co., 2995 Middlefield Rd., Palo Alto, Calif.—DAA, DAC, DAI, DAM, DAN

Kepco Laboratories, Inc., 149-14 41st Ave., Flushing 55, N. Y.—DAJ, DAM

Kleinschmidt Laboratories, Inc., P. O. Box 628 County Line Rd., Deerfield, Ill.—DAA

Kollmorgen Optical Corp., 2 Franklin Ave., Brooklyn 11, N. Y.—DAE

Laboratory for Electronics, 43 Leon St., Boston, Mass.—DAB, DAC, DAF, DAJ, DAM, DAN

Laurehk Radio Mfg. Co., 3927 Monroe Ave., Wayne, Mich.—DAA, DAI

Lavooie Laboratories, Inc., Matawan-Freehold Rd., Morganville, N. J.—DAA, DAB, DAF, DAJ, DAM, DAN

Lawton Prods. Co., 624 Madison Ave., New York, N. Y.—DAJ

Leece-Neville Co., 5109 Hamilton Ave., Cleveland 14, Ohio—DAM

Lektra Labs, Inc., 154 11th Ave., New York 11, N. Y.—DAA, DAG

Librascope, Inc., 1607 Flower St., Glendale 1, Calif.—DAE

Link Aviation, Binghamton, N. Y.—DAE, DAJ

Lionel Corp., Irvington, N. J.—DAA, DAB, DAC, DAF, DAI

Loral Electronics Corp., 794 E. 140th St., Bronx 54, N. Y.—DAA, DAB, DAF

Lysco Mfg. Co., 82 Herman St., E. Rutherford, N. J.—DAA, DAI, DAN

McColpin-Christie Corp., Ltd., 3410 W. 67th St., Los Angeles 43, Calif.—DAM

McElroy Mfg. Corp., Newton Rd., Littleton, Mass.—DAA

McLaughlin, J. L. A., 367 Bird Rock Ave., La Jolla, Calif.—DAA

Maryland Electronic Mfg. Corp., 5009 Calvert Rd., College Park, Md.—DAA, DAB, DAI, DAM, DAN

Massa Labs., 3868 Carnegie Ave., Cleveland 15, Ohio—DAP

Mauer, Inc., J. A., 37-01 31st St., Long Island City 1, N. Y.—DAE, DAJ

MELPAR, INC., 452, Swann Ave., Alexandria, Va.—DAA, DAB, DAC, DAF, DAI, DAJ, DAM, DAN

Merix Chemical Co., 1021 E. 55th St., Chicago 15, Ill.—DAA, DAB, DAJ

Microwave Equipment Co., Greenbrook Rd., Caldwell, N. J.—DAF

Mid-West Coil & Transformer Co., 1642 N. Halsted St., Chicago 17, Ill.—DAM

Minnestota Electronics Corp., 47 W. Water St., St. Paul 1, Minn.—DAJ

Modulation Prods. Co., 56 Lispenard St., New York 13, N. Y.—DAA, DAB, DAC, DAF, DAI, DAM, DAN, DAO

MOTOROLA, INC., 4545 Augusta Blvd., Chicago 51, Ill.—DAA, DAF, DAI, DAM, DAN

Movie-Mite Corp., 1105 Truman Rd., Kansas City 6, Mo. —DAA, DAF
Munson Mfg. & Service, Inc., Beech St., Islip, N. Y.— DAA, DAB, DAC, DAD, DAF, DAI, DAJ, DAK, DAL, DAM, DAN
National Electronics Laboratories, Inc., 1713 Kalorama Rd., N.W., Washington 9, D. C.—DAA, DAI, DAJ, DAM, DAN
National Electronics Mfg. Corp., 42-08 Vernon Blvd., Long Island City 1, N. Y.—DAJ
National Instrument Co., 23 E. 26th St., New York 10, N. Y.—DAA, DAB, DAC, DAF, DAG, DAJ
Neptune Electronics Co., 433 Broadway, New York 13, N. Y.—DAA, DAB, DAC, DAM
Network Mfg. Corp., 213 W. 5th St., Bayonne, N. J.— DAF, DAG, DAM
New London Instrument Co., P. O. Box 189, New London, Conn.—DAA
Nichols Prods. Co., 325 W. Main St., Moorestown, N. J.— DAF
North American Instrument Co., 23 E. 26th St., New York 10, N. Y.—DAF, ADJ, DAP
North Electric Mfg. Co., Galion, Ohio—DAA
NRK Mfg. & En'g Co., 5644 N. Western Ave., Chicago 45, Ill.—DAF
Oak Mfg. Co., 1200 N. Clybourn Ave., Chicago 10, Ill. —DAA, DAE
O'Brien Electric Co., 5326 Sunset Blvd., Hollywood, Calif.—DAA
Opad-Green Co., 71 Warren St., New York 7, N. Y.— DAM
Oregon Electronic Mfg. Co., 206 S.W. Washington St., Portland 4, Ore.—DAM
Orthon Corp., 196 Albion Ave., Paterson 2, N. J.—DAM
Packard-Bell Co., 12333 W. Olympic Blvd., Los Angeles 64, Calif.—DAA, DAB, DAF
Paillard Prods., Inc., 265 Madison Ave., New York 16, N. Y.—DAE
Pancro Mirrors, Inc., 2958 Los Feliz Blvd., Los Angeles 39, Calif.—DAE
Philco Corp., Tioga & C Sts., Philadelphia 34, Pa.— DAA, DAB, DAC, DAD, DAF, DAG, DAI, DAM, DAN, DAO
POLARAD ELECTRONICS CORP., 100 Metropolitan Ave., Brooklyn 11, N. Y.—DAI, DAJ
Potter Instrument Co., 115 Cutter Mill Rd., Great Neck, N. Y.—DAJ
Precision Products, Inc., 719 17th St., N.W. Washington, D. C.—DAE
Press Wireless Mfg. Co., Cantiague Rd., Hicksville, N. Y. —DAA, DAB, DAC, DAF DAG, DAI, DAJ, DAN, DAO
PRESTO RECORDING CORP., P. O. Box 500, Hackensack, N. J.—DAB, DAC, DAD, DAF, DAP
Product Development Co., 526 Elm St., Arlington, N. J.— DAA
Projection Optics Co., Inc., 330 Lyell Ave., Rochester 6, N. Y.—DAE
RADIO CORP. OF AMERICA, RCA-Victor Div., Camden, N. J.—DAA, DAM, DAN, DAO
RADIO ENGINEERING LABORATORIES, INC., 36-40 37th St., Long Island City 1, N. Y.—DAA, DAD, DAJ, DAN
Radio Frequency Laboratories, Boonton, N. J.—DAA
Radiomarine Corp. of America, 75 Varick St., New York 13, N. Y.—DAA, DAC, DAD, DAF, DAI, DAJ, DAN, DAO
Radio-Music Corp., 84 S. Water St., Pt. Chester, N. Y.— DAA, DAF, DAG
Radio Sonic Corp., 186 Union Ave., New Rochelle, N. Y. —DAD, DAM, DAP
Radio Specialty Mfg. Co., 2023 S.E., Sixth Ave., Portland 14, Ore.—DAA
Radio-Transceiver Laboratories, 116-23 Jamaica Ave., Richmond Hill 18, N. Y.—DAA, DAM
Ram Electronics, Inc., S. Buckout St., Irvington, N. Y.— DAG, DAM, DAN
Raypar, Inc., 7810 W. Addison Ave., Chicago 34, Ill.— DAM
Raytheon Mfg. Co., Willow St., Waltham, Mass.—DAA, DAB, DAC, DAF, DAJ, DAM
Ready-Power Co., 11231 Freud Ave., Detroit 14, Mich.— DAM
Reed Research, Inc., 1048 Potomac St., N.W., Washington 7, D. C.—DAJ
Reiner Electronics Co., 152 W. 25th St., New York 1, N. Y.—DAA, DAI, DAM
Republic Lens Co., 916 Ninth Ave., New York 19, N. Y. —DAE
Rosen Engineering Prods., Inc., Raymond, 32nd & Walnut Sts., Philadelphia 4, Pa.—DAA, DAI, DAJ, DAM, DAN
Rowe Industries, 1702 Wayne St., Toledo 9, Ohio—DAA, DAB, DAC, DAF, DAJ, DAM
Sangamo Electric Co., Converse Ave. & Eleventh St., Springfield, Ill.—DAM, DAP
SARKES TARZIAN, INC., 539 S. Walnut St., Bloomington, Ind.—DAA, DAD, DAF, DAG, DAI, DAJ, DAO
Schuttig & Co., 9th & Kearny Sts., N.E., Washington 17, D. C.—DAA, DAB, DAI, DAM
Self Winding Clock Co., 205 Willoughby Ave., Brooklyn 5, N. Y.—DAI
Servo Corp. of America, 2020 Jericho Turnpike, New Hyde Park, L. I., N. Y.—DAA, DAB, DAG, DAE, DAF, DAI, DAJ, DAM, DAN
Servomechanisms, Inc., Post & Stewart Aves., Westbury, N. Y.—DAB
Skoup Engineering Co., 221 E. Cullerton St., Chicago 10, Ill.—DAJ
Sierra Electronic Corp., 1050 Brittan Ave., San Carlos, Calif.—DAA, DAB, DAD, DAJ, DAM, DAN, DAO
Smith-Meeker Engineering Co., 157 Chambers St., New York 7, N. Y.—DAI, DAJ, DAM, DAN, DAO
SNYDER MFG. CO., 22nd & Ontario Sts., Philadelphia, Pa.—DAA
Sola Electric Co., 4633 W. 16th St., Chicago 50, Ill.— DAM
Sorensen & Co., Inc., 375 Fairfield Ave., Stamford, Conn. —DAM
Southwestern Industrial Electronics Co., 2831 Post Oak Rd., P. O. Box 13058, Houston 19, Texas—DAJ
Specialty Battery Co., 212 E. Washington Ave., Madison 3, Wisc.—DAG
Spectrum Engineers, Inc., 540 N. 63rd St., Philadelphia 31, Pa.—DAJ
Spellman Television Corp., 3029 Webster Ave., New York 67, N. Y.—DAM
SPERRY GYROSCOPE CO., Div. Sperry Corp., Great Neck, N. Y.—DAA, DAB, DAC, DAD, DAF, DAI, DAJ, DAN
Square Root Mfg. Corp., 391 Saw Mill River Rd., Yonkers, N. Y.—DAA, DAB, DAC, DAD, DAG, DAJ, DAK, DAM
Standard Coil Prods. Co., 2329 N. Pulaski Rd., Chicago 39, Ill.—DAA, DAM
Standard Electrical Prods. Co., 400-02 E. First St., Dayton 2, Ohio—DAM
Standard Electronic Research Corp., 2 East End Ave., New York 21, N. Y.—DAJ, DAM
Star Measurements Co., 442 E. 166th St., New York 56, N. Y.—DAF, DAM
Stephens Mfg. Corp., 8538 Warner Drive, Culver City, Calif.—DAJ, DAM, DAN
Sterling Instruments Co., 1331 Linwood Ave., Detroit 6, Mich.—DAJ, DAM
Superior Electric Co., 83 Laurel St., Bristol, Conn.—DAM
Taffet Radio & Television Co., 2530 Belmont Ave., New York 58, N. Y.—DAA, DAF, DAI, DAM, DAN, DAP
Talk-A-Phone Co., 1512 S. Pulaski Rd., Chicago 23, Ill.—DAA
Tech Laboratories, Inc., Bergen & Edsall Blvds., Palisades Park, N. J.—DAA
Technical Appliance Corp., 1 Taco St., Sherburne, N. Y.— DAM
TELECHROME, INC., 88 Merrick Rd., Amityville, L. I., N. Y.—DAA, DAF, DAI, DAJ, DAN
Telemark, Inc., 100 Greyrock Pl., Stamford, Conn.—DAA, DAB, DAF, DAI, DAJ
Telemetering Associates, P. O. Box No. 6, Silver Spring, Md.—DAG, DAN
Teletronics Laboratory, Inc., 352 Maple Ave., Westbury, L. I., N. Y.—DAG, DAM
Tel-Instrument Co., 50 Paterson Ave., E. Rutherford, N. J.—DAA, DAI, DAM
Telrex, Inc., Asbury Park, N. J.—DAA, DAC, DAM
Thordarson-Meissner Mfg. Div. Maguire Industries, Inc., 500 W. Huron St., Chicago 10, Ill.—DAN
Transmitter Equip. Mfg. Co., Inc., 345 Hudson St., New York 14, N. Y.—DAA, DAB, DAF, DAI, DAJ, DAM, DAN, DAO
Triumph Mfg. Co., 913 W. Van Buren St., Chicago 7, Ill.—DAA, DAF, DAI, DAJ, DAK, DAL, DAM
U. S. Gage Div., American Machine & Metals, Inc., Sellersville, Pa.—DAG
Univox Corp., 83 Murray St., New York 7, N. Y.—DAB
Vacuum Tube Prods., 506 S. Cleveland St., Oceanside, Calif.—DAJ
Van Cleef Bros., Inc., 7800 Woodlawn Ave., Chicago 19, Ill.—DAM
Varo Mfg. Co., Box 638 Garland, Texas—DAM
Vokar Corp., 7300 Huron River Drive, Dexter, Mich.— DAF, DAM
Waters Conley Co., Rochester, Minn.—DAB
Waveforms, Inc., 333 Sixth Ave., New York 14, N. Y.— DAA, DAJ
Western Sound & Electric Labs., 805 S. 5th St., Milwaukee, Wisc.—DAA, DAM
WESTINGHOUSE ELECTRIC CORP., Construction & Communications Sec. 10-L, E. Pittsburgh, Pa.—DAA, DAB, DAC, DAF, DAM, DAN, DAO
Weston Electrical Instrument Corp., 614 Frelinghuysen Ave., Newark 5, N. J.—DAA
WHEELER INSULATED WIRE CO., 150 E. Aurora St., Waterbury 20, Conn.—DAA
Winslow Co., 9 Liberty St., Newark 5, N. J.—DAA

36—Tools & Repair Materials

Fasteners ..... JAC
Fuses ..... JAA
Gasket ..... JAI
Solder ..... JAB
Solder Irons ..... JAE
Splicetool ..... JAG
Tools, Minor Repair ..... JAR

Anchor Metal Co., 87 Walker St., New York 13, N. Y. —JAB
Buchanan Electrical Prods. Corp., Hillside, N. J.—JAG, JAI
BUSSMANN MFG. CO., Div. McGraw Electric Co., University at Jefferson, St. Louis 7, Mo.—JAA
Chicago Expansion Bolt Co., 1338 W. Concord Pl., Chicago 22, Ill.—JAC
ELASTIC STOP NUT CORP. OF AMERICA, 2330 Vauxhall Rd., Union, N. J.—JAC
Forsberg Mfg. Co., Bridgeport, Conn.—JAB
Hassall, Inc., John, Clay & Oakland Sts., Brooklyn, N. Y. —JAC
KESTER SOLDER CO., 4201 Wrightwood Ave., Chicago 9, Ill.—JAB
Lenk Mfg. Co., 30 Cummington St., Boston 15, Mass.— JAB, JAE
Parker-Kalon Corp., 200 Varick St., New York 14, N. Y. JAC
Reed & Prince Mfg. Co., 1 Duncan Ave., Worcester 1, Mass.—JAC
Ruby Chemical Co., 68-70 McDowell St., Columbus 8, Ohio.—JAB
Saf-T-Flux Co., Box 64 Collegeville, Pa.—JAB
Star Expansion Bolt Co., 147 Cedar St., New York 6, N. Y.—JAC
Super Flow Solder Co., 90 State St., Albany, N. Y.— JAB
TINNERMAN PRODUCTS, INC., Box 6688, Cleveland, Ohio—JAC

Haraden Pratt Becomes Top Radio Figure in Federal Government

President Truman has appointed Haraden Pratt, vice president of the American Cable & Radio Corp., to the newly-created White House post of Telecommunications Advisor. Pratt, long identified with the radio industry, will advise the President on the rapidly-growing communications field, as indicated on the chart on page 27 of August TELE-TECH.

Haraden Pratt, Telecommunications Adviser to President Truman.

Appointment of such an Advisor was recommended last February in a report by the President's Communications Policy Board, suggesting staff assistants for the President in carrying out his responsibilities in the radio field.

Pratt will work out of the office of the National Security Resources Board which will furnish his office and staff assistants. He will draw a salary from funds available by the White House. His appointment does not require Senate confirmation.

President Truman's responsibilities include the assignment of frequencies of Government agencies (which precede FCC allotments) and control over all communications in the event of war or emergency. Advisor Pratt thus becomes top radio man in the Federal Government, with responsibilities superior to both FCC and IRAC.

Pratt's job will be a full-time one and he will leave his private connection to take over the assignment. He was born in San Francisco in 1891, and has been active in radio since 1906, holding many important corporation and industry committee appointments. In 1938 he was president of the IRE, and since 1943 has been its Secretary.

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